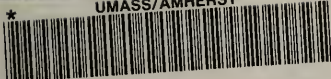
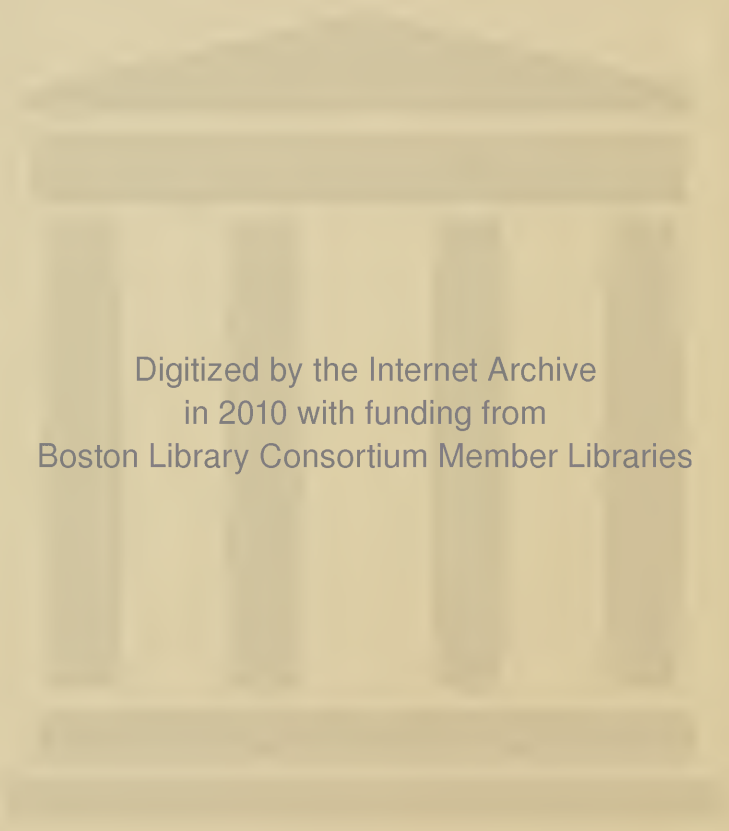


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The Commonwealth of Massachusetts

ANNUAL REPORT

OF THE

DEPARTMENT OF PUBLIC HEALTH

FOR THE

YEAR ENDED NOVEMBER 30, 1922



PUBLICATION OF THIS DOCUMENT
APPROVED BY THE
COMMISSION ON ADMINISTRATION AND FINANCE

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The Commonwealth of Massachusetts

DEPARTMENT OF PUBLIC HEALTH,
BOSTON, Jan. 17, 1923.

To the General Court of Massachusetts.

In accordance with the provisions of section 32 of chapter 30 of the General Laws I have the honor to submit herewith the annual report of the Department of Public Health for the year ended Nov. 30, 1922.

Respectfully,

EUGENE R. KELLEY,
Commissioner of Public Health.

EIGHTH ANNUAL REPORT

OF THE

DEPARTMENT OF PUBLIC HEALTH OF MASSACHUSETTS.

For the fiscal year ended Nov. 30, 1922, the State Department of Public Health was constituted as follows:—

Commissioner of Public Health EUGENE R. KELLEY, M.D.

PUBLIC HEALTH COUNCIL.

EUGENE R. KELLEY, M.D., *Chairman*.

SYLVESTER E. RYAN, M.D., 1925.

ROGER I. LEE, M.D., 1924.

WARREN C. JEWETT, 1925.

GEORGE C. WHIPPLE, S.B., 1923.

J. E. LAMOUREUX, M.D., 1924.

RICHARD P. STRONG, M.D., 1923.

During the year 15 formal meetings were held, as well as many meetings of standing committees and special boards. The standing committees are as follows:—

SANITARY ENGINEERING (INCLUDING HOUSING AND RURAL HYGIENE).

Professor Whipple, Dr. Kelley and Mr. Jewett.

PREVENTIVE MEDICINE AND HYGIENE.

Drs. Lamoureux, Kelley, Lee, Ryan and Strong.

FOOD AND DRUGS.

Drs. Lamoureux and Ryan and Mr. Jewett.

LABORATORY WORK AND RESEARCH.

Drs. Strong and Kelley and Professor Whipple.

PUBLICATIONS.

Drs. Ryan and Lamoureux and Professor Whipple.

In order to expedite the study and handling of various special problems or projects that have arisen during the year the Commissioner has from time to time appointed the following special boards upon which members of the Council have served and to the work of which they have devoted much thought, effort and time:—

TUBERCULOSIS BOARD.

Dr. Sumner H. Remick, *Chairman*.

Dr. J. E. Lamoureux.

Dr. Roger I. Lee.

Mr. Warren C. Jewett.

Dr. Bernard W. Carey.

Dr. Lyman A. Jones, *Recorder*.

MOSQUITO BOARD.

Mr. Warren C. Jewett, *Chairman*.

Prof. George C. Whipple.

Dr. Richard P. Strong.

Mr. X. H. Goodnough.

Dr. Oscar A. Dudley, *Recorder*.

As chairman of the Special Plumbing Board appointed in 1919 Professor Whipple has prepared a report for submission to the General Court in response to chapter 19 of the Resolves of 1922 relative to this matter, requesting that the time for presenting a final report thereon be postponed to January, 1924.

For the purpose of bringing about a closer and more direct contact between the Council and the four State tuberculosis sanatoria under the control of the Department the Commissioner has requested members of the Council living in or near the district where an institution is located to visit occasionally and generally interest themselves in its affairs. To Dr. Lee has been assigned Lakeville; Dr. Lamoureux, North Reading; Mr. Jewett, Rutland; and Dr. Ryan, Westfield.

In accordance with statute public hearings have frequently been held for the purpose of taking evidence and gathering data before reaching decisions or granting approvals required by law on the taking of lands by cities or towns for the protection of water supplies; on plans for systems of water supply and sewage disposal; on plans for hospitals for communicable diseases, police stations, etc.; on petitions for the abatement of nuisances of various types, notably among these being certain oil-refining plants declared or alleged to be so operated as to create a nuisance; and on various rules and regulations, State and municipal, relative to cold storage, slaughtering and the protection of foods and drugs.

At various times throughout the year as the work of the Department required it, the Council has in a body visited and inspected oil-refining plants, and has taken views of the premises involved in the study and investigation being made by the Department under the legislative resolves passed in 1922 relative to a water supply for Lawrence and Methuen and relative to the sewage disposal system of Salem and Peabody and the pollution of the North River.

At a meeting of the Public Health Council on Jan. 8, 1923, the Commissioner of Public Health presented to the Council a report of the activities of the Department for the fiscal year 1922, with recommendations for legislation; and it was voted that this report, together with the foregoing brief summary of the doings of the Public Health Council, be approved and adopted as the report of the State Department of Public Health for the fiscal year 1922.

EIGHTH ANNUAL REPORT OF THE COMMISSIONER OF PUBLIC HEALTH.

To the Public Health Council.

GENTLEMEN:—I have the honor to submit herewith my report for the year ended Nov. 30, 1922.

THE STATE OF THE PUBLIC HEALTH.

For the year 1922 it is again the agreeable duty of the Department of Public Health to report a continuance of the unusually satisfactory records of 1920 and 1921 in almost everything pertaining to the public health.

Again we can report almost complete absence of serious epidemics and relatively few distinct outbreaks of any communicable disease. Typhoid fever shows an impressive decline in mortality this year following the slight rise in 1921, and once again a new low record for this disease has been set for this State. This report must be submitted too soon to make it possible now to state the final official figures for the calendar year, but it is certain that the deaths from typhoid fever will be only about 80. This represents substantially a rate of 2 deaths per 100,000 of population, a rate so low as to have seemed impossible of achievement by any State only a few years ago.

Tuberculosis in all its forms shows a material decline below the record low mark of last year. It is worthy of note that the decline has everywhere slowed up markedly compared to the annual rate of decline since 1918. As was suggested in last year's report, it is altogether probable that we may be approaching the end of a period of decline of the tuberculosis mortality rate and we may even

experience a slight rise in this rate in the next few years. Nevertheless, the broad fact remains that notwithstanding the temporary increase during the war years our tuberculosis mortality continues to show an encouragingly consistent decline. It is perhaps only fair to state that of recent years there has come into prominence a statistical argument to the general effect that all this tuberculosis decline has been due to unfathomable causes which are assumed to have been operating quite independently of the intelligent, intensive and devoted struggle against the disease that has been one of the most pronounced features of public health and social development during the present century. To such a doctrine of sanitary pessimism, not to say nihilism, I cannot subscribe, and I see no valid reason for asking our fellow citizens to shape future policies in reference to this disease upon such a fatalistic basis.

Diphtheria has shown no epidemic of any magnitude, but continues to exhibit a distressingly high general prevalence with a persistent mortality of approximately 600 annually. Because of the needlessness of these deaths in the light of our present knowledge of diphtheria control, this Department has made a special effort to stimulate an interest in and better understanding of these newer weapons of diphtheria defence popularly known as "Schick" and "toxin-antitoxin."

Scarlet fever has been noticeably less widespread and less fatal than a year ago. Whooping cough during the latter part of the year has shown an increased prevalence and higher fatality, but does not exceed the average fatality of recent years.

Smallpox has established a new record — only two cases and no deaths being reported for the entire year. This showing is the more remarkable when it is recalled that a virulent form of the disease has recently assumed epidemic proportions in certain sections of an adjoining State.

There have been no epidemics of septic sore throat in the Commonwealth for the past year, but only the most watchful vigilance and prompt carrying out of drastic precautionary measures immediately upon the appearance of the first suspicious case on dairy farms have prevented several very threatening situations from developing into definite epidemics. Measles has shown about the same general prevalence as in 1921, both years being unusually low with a corresponding relatively low fatality.

The prevalence and fatality of lobar pneumonia has been gratifyingly low throughout the past year. Excepting 1921, when the mortality was even less, the total number of deaths from lobar pneumonia during this year has been less than for a great many years. This phenomenon of a marked reduction in pneumonia fatality has been a constant occurrence in this State each year since the great influenza epidemic of 1918. How much if any causal relationship may lie in the two facts, epidemiology in its present stage of development is incapable of answering.

Neither poliomyelitis nor epidemic cerebrospinal meningitis has appeared in epidemic form during the past year.

It is not in the communicable diseases alone that an encouraging report concerning the state of the public health can be rendered for the year just closing. Perhaps when the final compilations are available the general death rate may not equal the phenomenal low mark of 1921 but it certainly will be very nearly as low. Infant mortality continues low. One disease — cancer — stands out in sharp relief from the generally attractive picture because of its increasing frequency and fatality.

A more satisfactory report than ever before in regard to health promotion in contrast to disease recession can also be made. Very encouraging results are becoming manifest in many channels of positive health promotion and in activities tending to build up more vigorous physique and better correlated physical functions especially among children. Not alone by the wider activities of city and town boards and departments of health, but in the much keener and more intelligent interest of our educational authorities in health matters; in the rapid multiplication of various types of health clinics and children's health camps;

in the adoption of such State-wide legislation as the recent law requiring school nurses in all cities and towns; in the multiplication of courses in physical education; in the statutes providing for the special study of mentally retarded children; in the growing appreciation of the value of school dental hygiene teaching and dental service for school children; in the keen and increasing interest being manifested throughout the State in nutrition and the significance of underweight; in the multiplication of prenatal and well-baby clinics; and in scores of other ways we see clearly that the public is at last awakening to the significance of good health and insisting that the facilities for securing it for themselves and especially for their children shall be everywhere extended and improved.

THE MATERNITY AND INFANCY HYGIENE PROGRAM.

The Federal Sheppard-Towner act "for the promotion of the welfare and hygiene of maternity and infancy" came before the Legislature at its last session at the instance of the Department of Public Health for action as to acceptance or rejection. A general discussion of the principle of Federal aid was thereby precipitated, following which the Legislature voted almost unanimously not to accept the provisions of this act. In addition it instructed the Attorney General to bring legal action in the Federal Supreme Court to test the constitutionality of the Sheppard-Towner act. This action is now pending.

In the meanwhile, fully recognizing the value of intelligent progressive work in the field of maternity and infant hygiene, the Legislature appropriated the sum of \$15,000 for the use of the Department of Public Health for the balance of the fiscal year 1922, with the general understanding that approximately \$50,000 annually should be provided for the promotion of maternal and infant hygiene in lieu of acceptance of Federal funds for this purpose. Under this appropriation the Department has added to its staff a corps of physicians, nurses and other specialists in various phases of maternal and infant hygiene who are now actively at work in this large field. For more detailed information relative to the maternal and infant hygiene program of the Department the reader is referred to the supplementary report of the Division of Hygiene. I will here only summarize this program for the promotion of maternal and infant hygiene in Massachusetts as having a twofold object:—

1. More complete general diffusion of knowledge concerning maternal and infant hygiene.

2. More adequate provision of both medical and nursing care by means of the encouragement and expansion of local facilities for the furnishing of such care, regardless of whether those facilities are under public or private control.

Looking forward toward the achievement of these objectives the development of the program of the Department's activities is being carried out along the following lines:—

1. *Informational*.—This includes general press publicity and, to a very limited extent, newspaper advertising, literature prepared by this Department for general distribution, letters, "movies," lectures, conferences for mothers, special classes, etc.

2. *Public Health Nursing Extension*.—By carrying on surveys throughout the State an effort will be made to demonstrate to each community what its needs in public health nursing are and how nearly its facilities for this purpose approximate its needs. It is also proposed to carry out an extensive program of sectional and community conferences for nurses already employed in this type of work, to the end that the service they render may be made more uniform, more effective and better understood and appreciated by their communities. The Department does not intend to employ or subsidize the employment of public health and district nurses to do local household or local clinic work.

3. *Investigational*.—This phase of the program, in many ways the most important of all, has in the past been perhaps the most neglected. Our knowledge of the causes of maternal and infant mortality is too meager. Our information on this point can be extended only by painstaking and accurate field studies.

The simplest way to accomplish this is through the use of physicians who will discuss each maternal death with the attending physician, hospital and family. Many points are thus brought out which never could be obtained from a study of death certificates alone. The Department is following this plan. In this way can also be collected the ideas of medical practitioners throughout the State to the advantage of patient, physician and Department. The maternity hospital situation can also be studied at the same time.

The better to carry out this program, with the approval and advice of the members of the Public Health Council, I have invited a representative group of men and women interested in the subject to serve as a general advisory committee to the Department in the gradual development of the maternity and infant hygiene program. All of these men and women have consented to serve on this committee. With our well-organized enthusiastic executive staff to initiate new plans and carry out details and with the benefit of the composite scrutiny of this committee to check the soundness of these plans, together with the generous support of the legislative and executive branch of the State behind our program, there is every reason to anticipate material advances within the next few years in the field of maternal and infant hygiene in Massachusetts.

The personnel of the advisory committee and the groups they represent are as follows:—

Miss Mary Beard.
Dr. Edward F. Cody.
Dr. Robert L. DeNormandie.
Mr. Robert W. Kelso.
Mrs. Helen A. MacDonald.
Miss Gertrude W. Peabody.

Mrs. Arthur G. Rotch.
Dr. Richard M. Smith.
Dr. Halbert G. Stetson.
Dr. Fritz Talbot.
Mr. Edward E. Whiting.

Dr. Cody and Dr. Stetson represent the general medical profession; Dr. Smith and Dr. Talbot, the children's specialists; Dr. DeNormandie, the obstetricians; Miss Beard, the nursing profession; Miss Peabody, the district nursing organizations; Mr. Kelso and Mr. Whiting, both of whom served on the special recess commission on "Maternity Benefits," the professions of social work and journalism, respectively; Mrs. MacDonald, also a member of the "Maternity Benefits" Commission, represents the mothers of the State; and Mrs. Rotch represents a group of women's organizations which for years has deeply interested themselves in this problem.

THE TUBERCULOSIS SANATORIA.

The four State tuberculosis institutions under the control of this Department at Rutland, Lakeville, North Reading and Westfield have experienced a most satisfactory year.

Their record is satisfactory from several viewpoints. In the first place, without any lowering of standards of dietary, nursing or medical care and with certain permanent improvements in plant and equipment, it is possible to report substantial decreases in the total amounts of money necessary to maintain and operate the institutions as compared with recent years, as well as a very marked decrease in cost of maintenance per patient per week. However, owing to the present noticeably upward tendencies in both labor and material, I am of the opinion that it will require more money per capita properly to maintain and operate our institutions for the coming year.

Secondly, during the past year and for the first time since 1917 the institutions with one exception have again become filled to capacity and waiting lists are once more assuming uncomfortable lengths. In the face of a great drop in the death rate this outcome indicates a more intelligent utilization of these institutions by those who need them. No small part of the reason for this increased call for sanatorium service is due to the activities of the medical staffs of these institutions in co-operation with the field force of the Department, the various tuberculosis associations, local health authorities and the medical and nursing professions

generally in providing more frequent opportunities for expert examination and diagnosis throughout the State.

A third feature in the development of the sanatoria has been the successful carrying through of the plan proposed two years ago to use the Westfield institution as a sanatorium exclusively for children and adolescents. This transition has been brought about gradually by declining to admit new adult patients, and this policy has met with general approbation.

Also, it is with peculiar gratification that I can report a very pronounced improvement in the general spirit and morale of our institutional staffs. That spirit of general unrest and criticism that has swept over the country since the war has not been lacking in our institutional corps, but this year there has seemed to be to a marked degree a renewing of the spirit of service, of pride at being associated in no matter how humble a capacity with such a humanitarian undertaking as that represented by our sanatoria. I do not mean that all our staffs are content with their compensation, living quarters, or other conditions; but the general atmosphere of dissatisfaction, of desire for a change, no matter of what character, that has pervaded the atmosphere of institutional service since the war seems to have vanished during this past twelve months, to be replaced by a more wholesome spirit of service and of at least relative contentment.

CERTAIN OTHER ASPECTS OF THE TUBERCULOSIS SITUATION.

As previously noted, during the past year there has been a repetition of the low death rate for all forms of tuberculosis experienced in 1921. This has had the effect of rendering a review of the entire tuberculosis hospitalization program of the Commonwealth a very pertinent matter. The General Court has directed this Department to investigate the entire subject of tuberculosis, with particular reference to hospitalization policy. Inasmuch as the special report of the Department to the incoming Legislature will cover all phases of the subject, it is not necessary to go into details on this question at this point. A few general observations, however, may be of value in this report.

In the first place the marked fall in the death rate has totally changed the picture in the past ten years. Our hospital program as now carried out seems to provide a sufficient total of all the beds needed, but they are not properly distributed, and in a few instances the type of construction is so inadequate or even dangerous that their further use as tuberculosis hospitals ought to be discouraged. The "non-pulmonary tuberculosis" hospitalization problem has never been adequately solved, and the General Court has also directed this Department to report on this question, with recommendations as to how this need can best be met.

The problem of additional facilities for the treatment of tuberculous children increases in importance almost step by step with the decline in pressure for bed space for adults suffering from pulmonary tuberculosis. The so-called "Rollier" or sun treatment method for surgical or non-pulmonary tuberculosis for all age groups and for the bronchial gland type of tuberculosis in children has been carefully investigated and studied during the past year. In my judgment the conclusion is inescapable that this method offers such a powerful added weapon to our tuberculosis armament that the Commonwealth would be morally derelict in its duty if it is not more widely adopted. Fortunately the sun treatment has already been well tried out in several of our institutions, notably in the Westfield State Sanatorium for children and in the tuberculosis wards at the Tewksbury State Infirmary, as well as in several county and municipal institutions. Hence we have the experience and testimony of the medical staffs of our own institutions to supplement reports of institutions outside the Commonwealth as to the value of this method of treatment.

But to make the method readily available, particularly for adults suffering from surgical tuberculosis, special construction is essential to provide privacy and protection from air currents during the sun bath. Moreover the more recent work with very high powered X-ray machines generating approximately 200,000 volts has shown conclusively that by judicious combination of the sun treatment

and exposure to the X-ray at relatively long intervals better results can be obtained by far than the average results attained through surgical measures and achieved much more quickly than by reliance upon the sun treatment alone.

Of all the slogans commonly used in tuberculosis educational work that have stood the test of time and experience, those emphasizing that the earlier the detection the more satisfactory the results of treatment have proved their value perhaps more than any other. In the anti-tuberculosis program as at present carried out one thing that has always seemed to me as most incongruous is the generous fashion in which money has been made available for our "cure factories" — the sanatoria — and the parsimony that we as a nation generally have exhibited in failing to provide sufficient or adequate resources for getting our raw material, i.e., the patient, to the factory in the least damaged condition possible. Three types of "clinics," so called, have been developed to cover, in part, this need by increasing the facilities available throughout the State for the early diagnosis of tuberculosis:—

1. The municipally conducted "free tuberculosis dispensaries," which the law now requires all cities and towns over 10,000 in population to maintain.

2. The "consultation clinics," for cases referred by practicing physicians, which are held in various centers one day a month by the staffs of the four State sanatoria, and a practically equivalent service maintained by the staffs of some of our county tuberculosis hospitals within their particular hospital district.

3. The sporadic or "occasional" clinics among the pupils of the public and parochial schools for examination of "below par" children, as determined by "height and weight" data, exposure to existing cases of tuberculosis, etc. The tuberculosis nurses of the municipalities, school nurses, district nurses, and especially the nurses of the various tuberculosis organizations are principally responsible for the locating of these groups of children, and for arranging the details of the clinics. Closely associated with these clinics is the rapidly growing work of summer vacation camps and preventoria.

All of these three types of clinics perform a most useful function; and if we are ever to realize adequate health and efficiency "dividends" on the Commonwealth's heavy investment in tuberculosis institutions, this service should be better developed. The practical value of these clinics to the work of the State sanatoria is so great that at least one physician with a nurse assistant should be added to the staff of the Tuberculosis Division to have general supervision and direction over all this "tuberculosis finding machinery" throughout the State. Also an additional assistant physician for two of our four institutions should be provided at once, and for the other two sanatoria a similar addition to the staff is necessary as soon as housing facilities can be provided, in order that the staffs of our institutions may be enabled to continue their contribution to case-finding via the "consultation" and "examination" clinics without neglecting the medical care necessary for the resident patients in the tuberculosis sanatoria.

THE DIPHTHERIA PREVENTION CAMPAIGN.

The past year has witnessed a very great expansion of the program for diphtheria prevention throughout the Commonwealth. By all means within its power this Department has endeavored to impress upon the public three facts relative to diphtheria:—

1. That in spite of the unquestionable efficacy of antitoxin as a preventive and curative agent, its effect as a preventive agent is extremely transitory and that its efficiency as a curative agent is almost in inverse ratio to the duration of the disease prior to its use.

2. That as a result of these two limitations and the extreme difficulty of clearly distinguishing between diphtheria in its early stages and numerous other infections of the throat and nose, approximately 600 deaths from this disease occur annually within this Commonwealth.

3. That in "toxin-antitoxin" we now possess a safe, reliable agent for establishing an active long-time immunity lasting for many years in all individuals,

and that in the Schick test we have a method for determining whether or not a given individual is susceptible to the disease, and, if susceptible, in need of toxin-antitoxin to establish an active immunity.

The Department has also spread broadcast the information that it prepares for free distribution to physicians in the State the material for carrying out the "Schick" test and for active immunization against diphtheria. The response to this offer has been very gratifying, and public interest may be said to have followed a constantly rising curve throughout the year, until at present the demands for material are so great as to tax the resources of our biologic laboratories to meet them. Approximately 70,000 children have been immunized during the year. Several of our cities have been conspicuous for the interest displayed and the large amount of work done in this field by their health departments, aided and supplemented by their boards of education.

Boston, with approximately 26,200 children actively immunized during the year, takes first place in the number so treated, and great credit is due the officials of the Boston Health Department for the energy they have exhibited in safeguarding the children of their city by this measure.

If allowance is to be made for proportionate effort and results, Northampton, with a total of 4,000 actively immunized in a total population of not more than 25,000, certainly has established the record of achievement among all the cities and towns of the Commonwealth.

One of the unlooked-for results of this campaign, however, has been the degree of interest aroused in many of the smaller towns of the State, several of which — Hadley, Hatfield or Dalton, for instance — can show from 300 to 400 immunized children in a total population of all ages of from 3,000 to 4,000.

CANCER.

I feel it is incumbent upon me to call to your attention the alarming increase in the reported mortality of cancer. The subject is one which affects the family circles of the great majority of the citizens of this Commonwealth. Viewing the magnitude of this disease as a cause of death and disability, I feel that every one will approve greater activity on the part of the State than has hitherto been possible within our limited appropriations in studies, service and educational measures looking towards the better control and cure, as well as mitigation of the suffering common to the later stages, of this disease. The difficulty is that we know but very imperfectly how best to expend money or effort towards these ends. In this State the work of the Huntington Memorial Hospital and the Harvard Cancer Commission already covers the field of research and X-ray treatment assumed as a public function by a neighboring State through its Cancer Institute at Buffalo. The Commonwealth has already provided through this Department a sum of money — very small in comparison to the size of the problem, but apparently relatively adequate when applied to the definite tangible services that can be furnished — to promote wider diffusion of knowledge and to facilitate earlier laboratory diagnosis.

I believe we should at present hold ourselves in a receptive attitude towards reasonably economical and reasonably promising proposals of any character designed to check the increase of cancer so long as such measures can be applied universally, or, in other words, from the public rather than the individual health standpoint.

CERTIFIED MILK.

During the past year considerable publicity was given for a time to the death from tuberculosis of an infant in the Boston Children's Hospital under circumstances which suggested at least a possibility that the infecting organism might be of bovine rather than of human origin, and, if bovine, the evidence seemed quite conclusive that the only source of infection must have been milk produced by a certified herd.

This occurrence led me to call together the medical milk commissions of the

State for conference, and to institute a field investigation into all the details of procedure on dairy farms operating under milk commissions.

I am convinced that under present conditions there exists a very definite possibility of the milk of certified herds becoming infected before the present administrative routine can detect and eliminate the offending animal; hence, we have recommended certain changes in the law relating to certified milk to insure more rigid supervision.

WATER SUPPLY REPORT.

Last year there was completed a three years' investigation of the water supply needs and resources of the Commonwealth by this Department and the Metropolitan District Commission, functioning as a special joint board for this purpose. As a result of this study all the members of this Department and four of the five members of the Metropolitan District Commission recommended that steps be taken in the early future to provide for —

1. An enlargement of the present total sources of water supply for the Metropolitan District by an extension to the Ware River.

2. Inclusion of the city of Worcester among the municipalities to receive water from this new additional source of supply.

3. When needed, an extension farther west to tap a larger artificial impounding reservoir to be constructed in the valley of the Swift River and filled entirely by the excess or freshet flows of this stream and tributaries, plus freshet flows from a portion of the Millers River watershed to be diverted into the Swift River Reservoir.

4. The creation of a new water district to include all the Lakeville ponds and to provide for the future water supply needs of three large cities in southeastern Massachusetts and the towns in their vicinity.

The Joint Board also reported that further investigation and study would be necessary before it would be possible to give definite well-grounded advice as to the best method of providing for the urgent water supply needs of certain Essex County cities and towns and the cities and towns of the lower Merrimack valley.

One member of the Joint Board, the chairman of the Metropolitan District Commission, dissented from the majority opinion on the grounds that there was no need of immediate steps being inaugurated to provide for a reservoir in the Swift River valley, although he did predict the ultimate necessity of such a procedure. The majority felt that it would be imprudent and even unsafe to postpone any action for a period of ten years as suggested by the dissenting member, especially as it is highly probable that new units requiring water supply will soon have to be added to the district, with a resulting disappearance within a few years of the present "margin of safety," even making full allowance for the maximum utilization of certain existing auxiliary sources of supply at present only very lightly drawn upon. If there should occur a material increase in population or a series of successive periods with marked deficiency in rainfall, a condition of actual water shortage is likely to result in the Metropolitan District. Therefore, notwithstanding the heavy cost of the proposed project, they felt impelled to urge prompt adoption of the plan in general and early execution of the first unit of construction, viz., the tunnel to the Ware River.

The matter became involved in extended discussion within the Legislature, and the result was the recommendations of the Joint Board were neither definitely accepted nor rejected, and no further legislative instructions were issued to either the State Department of Public Health or the Metropolitan District Commission. As the temporary Joint Board composed of the total membership of both Departments automatically ceased to exist upon the filing of their report with the Legislature, there seems to be no other conclusion than to consider the whole matter in a state of suspended animation. It is obvious it cannot be left there. Water supply questions are too numerous and affect too seriously the health and welfare of the citizens of this State to permit indefinitely the postponement of these problems.

From the facts above cited, it can be seen readily that there has been left open

no channel through which the Department can bring the subject before the incoming Legislature except as a concrete new legislative recommendation without reference to the Joint Board's acts.

We have given our best judgment and have urged action with all vigor possible. As a Department we are always available to give information and advice on the subject to the Legislature, its committees and members. I have therefore recommended that as a Department no legislative recommendations in these matters be made outside of the specific questions upon which we have been expressly ordered by special resolves to report to the incoming Legislature.

THE OIL NUISANCE QUESTION.

In my last annual report a brief history was given of the establishment of oil-refining plants concerning whose operations nuisance had been charged by adjacent residents and property owners, and that in one instance a petition was filed in accordance with law, asking that this Department take steps to abate the alleged nuisance. It will be recalled that when the last fiscal year ended, this plant, located in the town of Braintree, had been adjudged to have been so conducting its business as to cause serious nuisance and had been ordered to close, but, pending the installation of certain new equipment and the carrying out of other measures designed to correct the nuisance, this closing order had from time to time been suspended to permit determination of the results of such installations and changes in manufacturing procedure.

On March 28, 1922, this Department ruled that these improvements and changes had not brought about the desired result, the suspension of the closing order was terminated, and the company ordered to close down those parts of its plant the operation of which resulted in the discharge of obnoxious odors.

The company appealed from this decision and demanded their statutory privilege of a trial by jury. Under the advice of the Attorney General's office this Department authorized continuation of the processes of this plant which it had ordered stopped pending the outcome of trial. The case finally came to trial in the November term of court, and by agreement a verdict was returned admitting existence of a nuisance and requiring a shutdown of the plant until a specified list of improvements (costing in the aggregate about \$150,000), designed to control obnoxious odors, are carried out to the satisfaction of this Department.

The verdict further stipulates that if the subsequent operation of the works produces a recurrence of obnoxious odors sufficient to create a nuisance, the Department may reopen the matter at any time.

The refinery at Fall River has also been the source of very strong complaints; but inasmuch as practically all the people affected were citizens of the same city in which the plant was located, they instituted proceedings through the local board of health and did not appeal to this Department for decision and action. It would seem as if this company has been reasonably successful in its attempts to control the escape of obnoxious odors inasmuch as the agitation as portrayed in the public press seems to have subsided since the installation of extensive improvements at the plant by the management.

Citizens of Everett, Chelsea and Malden, however, have petitioned this Department during the present year for relief in the matter of obnoxious odors emanating from the plant of the Beacon Oil Company in Everett. The Department has not ordered the closing of this plant pending the installation and trying out of new apparatus and equipment for the purpose of controlling the noxious odors complained of. The latest reports of our engineers, supplemented by the testimony of many of the original complainants, indicate a very marked improvement in respect to this plant, but final decision in the matter has not yet been made.

THE MOSQUITO PROBLEM.

The excessive rainfall of the season just past has brought the mosquito nuisance into unprecedented prominence.

Largely owing to the interest and initiative of a member of this Department, Prof. George C. Whipple, an organization, known as the Massachusetts Anti-Mosquito Association, has been formed for the purpose of arousing public sentiment in regard to the suppression of the mosquito nuisance. To co-operate with this association, and after discussion with the Public Health Council, I appointed the following Mosquito Board:—

Mr. Warren C. Jewett, *Chairman*.
Prof. George C. Whipple.
Dr. Richard P. Strong.
Mr. X. H. Goodnough.
Dr. Oscar A. Dudley, *Recorder*.

Permanent work in mosquito control is fundamentally a problem of eliminating breeding places. So far as this should be carried out by public action, it would seem as if in creating the Massachusetts Drainage Board—a permanently functioning joint organization composed of one representative each from this Department and the State Department of Agriculture—a supervising and correlating State body has been made available which is susceptible to future expansion so as to permit cities and towns, under its guidance, to attack the mosquito problem economically, intelligently and efficiently.

The other large element in mosquito control work, namely, the co-operation of the individual property owner, can best be stimulated and directed by such an organization as the Massachusetts Anti-Mosquito Association. Therefore, beyond giving this organization our hearty moral support and initiating or carefully studying proposals made by others on their individual merits through the agency of the State Drainage Board, recommending such action as may seem appropriate in each individual circumstance, I do not recommend at this time any additional appropriation for the purpose of mosquito eradication and control.

PERSONNEL CHANGES.

Changes in personnel have happily been much fewer than for several years past. Mr. Charles J. O'Brien of Chicopee, chairman of the State Board of Examiners of Plumbers, died on November 24. Mr. O'Brien had been appointed chairman following the resignation of Mr. James Coffey early in 1921. Mr. O'Brien had devoted much thought and work to the duties of the position he occupied, and his loss is keenly felt not alone in this capacity but even more because as agent of the Chicopee Board of Health he had for many years been closely associated with many of the staff of this Department.

Dr. Francis A. Finnegan, District Health Officer of the Worcester District, resigned from that position to enter upon new duties as director of school hygiene for the city of Lowell. Dr. Oscar A. Dudley was transferred from the Berkshire District to the Worcester District, and Dr. Leland M. French, epidemiologist of the Department, succeeded Dr. Dudley as District Health Officer of the Berkshire District. Dr. Wolfert G. Webber was appointed epidemiologist.

Another keenly regretted resignation during the year was that of Mrs. Alzira W. Sandwall, health instructor in nutrition. Mrs. Sandwall's work in this Department was of a pioneer character, and her unique methods of arousing and fixing popular interest in the subject of nutrition had deservedly brought to her and the Department national attention.

With the inauguration of the work on maternity and infant hygiene, Miss Cecilia A. Lemner, formerly nursing assistant of the Eastern District, was appointed supervising nurse to the new corps of field nurses taken into the State service to carry out this work, and Miss Helen C. Reilly, formerly public health instructor in charge of exhibits for the Division of Hygiene, succeeded Miss Lemner as nursing assistant for the Eastern District. A group of three additional physicians, an additional nutrition worker, as assistant to the director in the editing and preparation of health educational literature, a statistician and additional

stenographic and clerical assistance have also been added to the personnel of the Division of Hygiene to carry out these new duties.

Miss Frances B. Mayer and Mr. Bernard Bradley have been appointed investigators for the Subdivision of Venereal Diseases.

Several changes in the technical staffs of the various divisions have also taken place, but not as many as in the past few years.

An interesting new development of the scope of the Department's activities, which bids fair to add definitely to the scientific accuracy and completeness of our knowledge of communicable diseases, has been brought about during the fiscal year by the appointment, without salary, of Dr. George C. Shattuck, a well-known authority on tropical and subtropical diseases, as a collaborating epidemiologist to the Department for these diseases.

SPECIAL LEGISLATIVE REPORTS AND LEGISLATION RECOMMENDED.

In accordance with the following resolves and order, reports will be submitted by the Department to the Legislature of 1923:—

Chapter 19, Resolves of 1922.—Report relative to the advisability of revising and codifying the rules, regulations and ordinances of the various cities and towns of the Commonwealth concerning plumbing, house drainage and like subjects.

Chapter 26, Resolves of 1922.—Report as to advisability of providing new or additional hospital accommodations for the treatment of surgical or non-pulmonary tuberculosis.

Joint House and Senate Order.—Report in response to legislative order on tuberculosis.

Chapter 40, Resolves of 1922.—Report on investigation of the present sewerage system of the cities of Salem and Peabody and also on investigation as to the cause of pollution of the North River in said cities.

Chapter 53, Resolves of 1922.—Report upon water supply for the city of Lawrence and the town of Methuen.

The following legislation has been recommended by the Department:—

First.—An act relative to medical milk commissions.

Second.—An act relative to the manufacture and sale of mattresses.

DIVISION OF ADMINISTRATION.

In the Division of Administration records and accounts have been handled in accordance with the system described in previous reports. Owing to various factors the work of this Division has greatly increased in the past few years.

DIVISION OF SANITARY ENGINEERING.

The number of applications for advice received by this Division during the year with reference to water supply, drainage and sewerage has been 203. Of this number, 148 have related to water supply, 11 to ice supply, 18 to sewerage, 9 to pollution of streams, and 17 to miscellaneous matters.

A large part of the work of the Division consists of consultation by the chief engineer and the principal assistants with the authorities of cities and towns and with others concerning matters relating to water supply, drainage, sewerage and kindred subjects.

The rainfall for the year 1922 was in excess of the average throughout the State, a condition which has now prevailed for several years. Its distribution, furthermore, was very uneven, the total rainfall for the month of June, which is ordinarily the lowest of the year, amounting in places to over 14 inches, while the minimum monthly rainfall was only about 0.72 inches. There were excesses of more than an inch also in the months of March, May, July and August, while in January and February the rainfall was below the normal, and the same was true of September,

October and November, though the deficiency in September was very slight. The greatest deficiency occurred in the month of November and amounted to something over 2.5 inches.

The excessive rainfall in the spring and summer produced an unusually high flow in the streams, especially in the part of the year when the flow is usually low. For example, the average flow of the Nashua River in the first ten months of 1922 was 31 per cent in excess of the average for that period and about two and one-half times the flow in that period in a dry year, as shown by the records of a quarter of a century. It exceeded the flow in ordinary dry periods, such as occur every three or four years, by more than 60 per cent. As a result of the great rainfall and flow of rivers, the water supply reservoirs were in most cases filled to overflowing early in the year, and, as a rule, have been maintained at a much higher level than has been known in many years. This great flow in the streams has aided in the dilution of sewage and of foul wastes discharged into the rivers, and very few complaints of the pollution of streams have been made, though the amount of pollution entering the rivers was probably in the aggregate considerably greater than in the previous year.

Water Supply and Sewerage of State Sanatoria.

Besides the usual work of the Division it became necessary toward the end of the year to take up questions of water supply and sewerage in connection with State sanatoria for the Division of Tuberculosis.

Drainage of Wet Lands.

A small amount of work has also been done during the year to assist the Drainage Board in connection with plans for the drainage of wet lands, for which there appears already to be a considerable demand.

Improvement of the Neponset River.

A contract for the construction of bridges on certain rights of way provided for by the Legislature in 1922 was let and work was begun in the latter part of the year.

The commission, appointed by the Supreme Judicial Court in the latter part of 1921, in response to the application of the Department, to determine what proportion of one half the total expense incurred under the provisions of chapter 655 of the Acts of the year 1911, entitled "An Act relative to the Protection of the Public Health in the Valley of the Neponset River," and acts in addition thereto, shall be paid by the various municipalities mentioned in said acts, began its work near the end of the year.

Special Investigations.

Special investigations have been carried on during the year, under orders of the Legislature, with reference to the sewerage of Salem and Peabody and the water supply of Lawrence and Methuen. As these matters will be reported to the Legislature in special documents, it is unnecessary to review them here.

DIVISION OF WATER AND SEWAGE LABORATORIES.

During the year 1922 the Division of Water and Sewage Laboratories made 8,503 chemical, 3,800 bacterial and 2,201 microscopical analyses of water, sewage, filter effluents, etc., as well as a number of investigations. The chief work along this line was on the following subjects:—

1. A very complete study, in connection with the Division of Sanitary Engineering, of the Salem-Peabody sewerage system, the character of the wastes entering this system from tanneries, glue works, etc., the efficiency of the treatment plants in operation at these works, the cause of the deposits accumulating in the sewers

and clogging them, the character of these deposits, and methods for preventing the entrance of the chemicals tending to cause clogging.

2. With the Division of Sanitary Engineering a study of certain very serious nuisances caused by oil refineries. This investigation called for much field work and analyses of air for the determinations of sulphur gases present, and analyses of oil, etc., in connection with the pollution of harbor wastes, beaches in the vicinity of the works, and the percentage of sulphur present in certain crude oils treated at these refineries.

3. Studies of the purification of wastes from creameries, pulp mills, paper mills, tanneries and from other industrial works, and of the oxygen demand on streams caused by such wastes when entering them untreated.

4. An investigation of the pollution and natural purification of a small river with several mills, mill ponds, etc., along its course. This included very complete observations concerning the volume and character of the wastes, the condition of the rivers and the ponds, and the nuisance or lack of nuisance arising from such conditions. The data accumulated are of quite general application.

5. The important results from the operation of water filters impregnated with aluminum hydroxide obtained during previous years suggested further developments of this process, with interesting results. A non-corrosive water low in color can apparently be obtained in this way at a much lower cost than by any other method. The process, while not applicable to all waters, is quite efficient with clear, highly colored and soft waters of rivers and storage reservoirs.

6. Studies were made of the hydrogen ion concentration as a factor in water purification, etc., especially by mechanical filtration. In this work it is too early to give a definite opinion as to the value of the determination.

7. Many studies were continued at the Experiment Station on the purification of sewage, water, etc., by means of experimental filters, tanks and other apparatus, and an especially interesting study has been carried on now for two and one-half years in regard to the purification of sewage in small air-tight septic tanks, these tanks being of suitable size for household use,—one operated with Lawrence sewage and the other with fresh household sewage.

8. Many laboratory investigations were made of bacterial methods in connection with the work of the standard method committees of the American Public Health Association and the American Water Works Association, these calling for comparative work with other laboratories and the criticism of certain methods and data submitted to this Division from laboratories in various parts of the country. The director and his two principal assistants have revised and rewritten a large part of the chemical and microscopical methods for the committee on standard methods of the American Water Works Association.

DIVISION OF COMMUNICABLE DISEASES.

The year has been most remarkable in that there has not been a single outbreak of any disease of sufficient size or severity to necessitate special attention from this Division. The persistent decline in the death rate, with resulting new low levels for pulmonary tuberculosis, typhoid and diphtheria, clearly demonstrates the value of the preventive measures employed in the modern program of public health. We can no longer doubt that the efforts of the Department, local authorities and other organizations in the past years in the education of the public in hygienic living are now producing their fruits.

The typhoid mortality rate of approximately 2 per 100,000, a new low record, is also eloquent of public health activity, showing as it does the result of intensive investigation of sources of infection for individual cases. Typhoid fever in Massachusetts no longer appears to be a problem of water supply or disposal of sewage but rather that of infection resulting from a carrier, and future efforts must be directed more intensively to the detection of the typhoid carrier. During the past year 4 typhoid carriers were discovered, making a total of 55 under observation.

The diphtheria situation is most promising. While there has been in many communities continued high incidence, the earlier recognition of the condition,

the more complete and adequate treatment of the case, the immunization of contacts, together with the protective work of the Schick test and toxin-antitoxin program, have saved lives to an appreciable extent.

The Schick test and the toxin-antitoxin immunization program is being received with increasing interest. Of the 90 larger communities in which this program has been particularly urged by this Department, over two-thirds have already undertaken it with marked success. It is as yet too early to say with certainty how much this program of itself has in any given community effected a diminution in either case or mortality rate. It can be said, however, that no death from diphtheria is known to have occurred in any Schick-negative or immunized individual. The city of Northampton, with 4,500 children immunized, has had but 5 cases in the past five months, with no deaths, while many surrounding communities have had a rather high incidence for the same period.

A problem, as yet little studied, is that of secondary cases of diphtheria within households or in tenement houses with the same address. A study of this matter is now being conducted.

Multiple cases of typhoid fever show most frequently a common source and time of infection, while for diphtheria the reverse is true, many cases resulting from infection received from the case within the household, that is, sufficient incubation time has elapsed before the second case has been reported.

There has not been a single case of blindness in the new-born resulting from ophthalmia neonatorum during the past year. Indeed, for the past five years, since 1917, there is no living child so afflicted. This is a most remarkable improvement due largely to the almost universal use by physicians of the silver nitrate solution furnished by the Department. Great credit is due the Division of the Blind of the Department of Education for their intensive and continued interest in this phase of their work.

Decreases in incidence in practically all of the more common communicable diseases are noted, with the exception of measles, lobar pneumonia, influenza and "dog bite requiring antirabic treatment."

A new record has been established for smallpox. But two cases, one of which is of extremely doubtful diagnosis, were reported. When it is considered that a neighboring State, Connecticut, had a severe outbreak approximating 500 cases and that many of the western States had an undue amount of smallpox of a most virulent type, the mortality in some instances reaching 30 per cent, confidence in vaccination as a prophylactic must be increased.

A very sudden, marked increase in the reported incidence of influenza was shown in February and March, quickly subsiding in April. This outbreak of some 6,860 cases, with 353 deaths, shows all the evidence of epidemic influenza.

The venereal disease program has been continued along the same general lines as in former years, with somewhat lessened activity due to a decrease in personnel. The reported incidence of both gonorrhea and syphilis has shown a marked decrease. It is believed that there has been an actual reduction in the amount of venereal infection, but it is quite apparent that a part of the decrease comes from the non-reporting by physicians who evidently believed the reporting was a war measure and that with the cessation of the war the need to report vanished. This, of course, is far from the actual situation, and the need is equally great that our civilian population may be adequately protected. With the addition of a female medical social service worker and two male investigators, more work on sources of infection and lapsed cases is being done than ever before. To insure more complete treatment, the Department has undertaken the free distribution of bichloridol. This preparation, a solution of bichloride of mercury suspended in oil, has been received with much enthusiasm by the chiefs of the State-approved clinics.

The work of the Bacteriological Laboratory has continued along the same general lines as in past years.

The following tables give certain statistical data for the past year relating to the work of this Division.

TABLE I. — Venereal Disease Subdivision Statistics.

	1921.	1922.	1922.	
			Increase.	Decrease.
Arsphenamine, figured on 0.6 gram doses	39,473	38,339	866	—
Pamphlets distributed	37,802	19,630	—	18,172
Lapsed cases reported	1,147	1,411	264	—
Lapsed cases returned to treatment	327	386	59	—
Cases reported	8,060	6,921	—	1,139
Gonorrhea	5,563	4,923	—	—
Syphilis	2,497	1,998	—	—
Smear examinations	2,478	2,497	19	—
Wassermann examinations	42,957	47,486	4,529	—
Lectures	73	20	—	53

TABLE II. — Cases of Diseases Dangerous to the Public Health reported during Calendar Year 1922.

DISEASES.	Cases.	Deaths.	DISEASES.	Cases.	Deaths.
Actinomycosis	3	2	Mumps	4,358	1
Anterior poliomyelitis	217	34	Ophthalmia neonatorum	1,219	—
Anthrax	3	1	Pellagra	15	9
Chicken pox	5,177	8	Pneumonia, lobar	5,194	2,336
Diphtheria	8,826	587	Rabies	2	5
Dog bite requiring antirabic treatment	181	—	Scarlet fever	7,868	146
Dysentery	14	9	Septic sore throat	123	25
Encephalitis lethargica	163	82	Smallpox	2	—
Epidemic cerebrospinal meningitis	105	38	Syphilis	1,933	207
German measles	480	2	Tetanus	33	22
Gonorrhea	4,973	10	Trachoma	96	—
Hookworm	42	—	Trichinosis	19	3
Influenza	7,453	591	Tuberculosis, pulmonary	5,562	3,264
Leprosy	1	—	Tuberculosis, other forms	817	456
Malaria	48	4	Typhoid fever	693	86
Measles	23,291	214	Whooping cough	6,823	300
				85,734	8,441

TABLE III. — Examinations during the Fiscal Year in the Diagnostic Laboratory.

	Total.	DIAGNOSIS.		RELEASE.	
		Positive.	Negative.	Positive.	Negative.
Diphtheria	21,356	1,459	13,873	1,907	4,117

	Total.	Positive.	Negative.	*Atypical.
Tuberculosis	4,441	994	3,447	
*Typhoid fever (Widal test)	1,544	291	1,210	43
Typhoid fever (culture test)	571	47	524	
Malaria	91	3	88	
Gonorrhea	2,503	371	2,132	
Pneumonia	575			
Miscellaneous	377			
Total	31,458			

DIVISION OF TUBERCULOSIS.

Last March, for the first time in several years, all the State sanatoria were filled to capacity and a waiting list created. At present there are vacancies for men at Lakeville, but there is a long waiting list for women which is increasing for all institutions. During the year all adult patients have been discharged or transferred to other institutions, making Westfield a children's sanatorium. Despite this increased bed capacity for children a waiting list continues. This demonstrates that physicians, health officials and the public have awakened to the importance of institutional care for tuberculous children.

The "examination" clinics are playing a great part in discovering tuberculosis in children. This service has been growing by leaps and bounds and is one of greatest importance, having larger possibilities for discovery of early tuberculosis than any other method. Last year these clinics were confined to the western part of the State, but through the enthusiastic co-operation of the Massachusetts Tuberculosis League they have been carried into all parts of the State during the present year. There are now at least sixty towns in the State waiting for such clinics. The amount of valuable work that can be done here is limited by the number of diagnosticians available from our sanatorium staffs. An increase of these staffs, to extend the work of examining children and adults in the smaller towns, is urgently needed.

The "consultation" clinics are becoming very popular and are being utilized to a greater extent than ever before by physicians and communities. Other cities have requested this service, and final arrangements have been made to provide such clinics for Malden and Newburyport. Tentative arrangements have also been made to care for Greenfield and vicinity. It is interesting to note that more and more ex-patients have been returning to the sanatoria for re-examination and advice. Hundreds of notices have been sent out notifying the physicians when and where clinics were to be held. This task of notifying physicians has been taken over by the local tuberculosis associations, thereby relieving the Department of the clerical work involved.

City and Town Tuberculosis Dispensaries.

Monthly reports are now being sent to the Department from every tuberculosis dispensary. Although the total number examined throughout the State in the municipal dispensaries has been larger than last year as a whole, they are not doing the total volume of physical examinations that is desirable and possible. The tuberculosis dispensary law ought to be changed to make the mandatory maintenance of such institutions only applicable to the larger cities. Possibly a certain amount of direct financial assistance from the Commonwealth is desirable.

Two Public Health Nurses' Association meetings have been held during the year, — one at Westfield, attended by 100, and one at Rutland, attended by 115. Meetings of the district medical societies have been held at Lakeville, and local society meetings or small groups of physicians have held meetings at other institutions. This not only gives the physicians a chance to see the sanatoria at work, but is an important factor in the plan of making the institutions centers of education in this line of work.

It is very gratifying to be able to report that a splendid spirit of co-operation is steadily increasing among local health agencies, the physicians of the State generally and the Division of Tuberculosis of this Department.

DIVISION OF HYGIENE.

In 1921 an amendment to the statutes was passed dealing with school hygiene, which provided that every city and town should have school nursing service. Discretion was given the State Department of Education to exempt towns with a valuation of less than \$1,000,000. The result of this law has been a great in-

crease in the number of school nurses throughout the State during the past year. The inevitable result of such a rapid expansion of school nursing was that a supply of adequately trained school nurses was not available and towns were obliged to employ graduate nurses who had no special public health training. Some towns, not appreciating the need of even this amount of training, employed non-graduates.

It was felt by both the Department of Education and the Department of Public Health that the acute problems arising from this rapid expansion should be met by joint action of the two departments. Consequently it was decided to hold a series of conferences on the subject of school hygiene, to which should be invited school physicians, school nurses, school superintendents and members of school committees. In all, nine such conferences have been held at the State normal schools, with most encouraging results. The meetings have been well attended and marked interest shown by all. There is every reason to believe that the carrying out of the school nurse law has been rendered much easier and more efficient by these conferences.

Promotion of Maternal and Infant Hygiene.

The developments along these lines have occupied much of the energies of the Division of Hygiene for the past year. As they have already been outlined in the general account of the Department and as a much more detailed account is given in the full report of this Division, no additional description is necessary here.

Nutrition in its Relation to Health.

The importance of the rôle which nutrition plays in the promotion of health is becoming increasingly evident. Those interested in dental hygiene are stressing the need of a suitable diet if any real headway is to be made against dental caries. The tuberculosis worker looks to nutrition classes for assistance in fighting this disease. During the past year this Department has extended the scope of its activities to the extent of employing a second nutritionist. With this addition to our field force it is hoped to start study groups in the nutrition of the prospective mother. It will also be possible to conduct classes for school nurses as well as for the nurses throughout the State doing prenatal, maternity and postnatal nursing.

Mouth Hygiene.

The work in mouth hygiene has progressed along the same lines as in previous years, with a gratifying increase in the number of cities and towns which are inaugurating dental hygiene programs for school children.

An incident in the year's work in mouth hygiene was the participation of the Department in the meeting of the National Dental Association at its annual meeting. The health instructor in mouth hygiene represented the Department at the meeting, and with her went the mouth hygiene exhibit which the Department uses in its campaign of popular education. It was most gratifying to learn that the Massachusetts exhibit was awarded first prize. This happy event would have been impossible had it not been for the generosity of the Massachusetts Dental Society, which paid the traveling expenses of our dental hygienist to the convention, the State taking care of the expenses while in Los Angeles.

Cancer.

The diagnostic service for physicians whereby they may obtain free diagnosis on pathological specimens suspected of being cancerous has been continued. During the year ending June 30, 1922, 2,182 specimens were examined as compared with 1,604 for the previous year. These examinations are made for us by the Harvard Cancer Commission. In addition to this informational material dealing with the diagnosis and prevention of cancer has been distributed to the public. The Department takes its share in the promotion of "Cancer Week," assisting in every way possible the Massachusetts Committee of the American Society for the Control of Cancer.

DIVISION OF BIOLOGIC LABORATORIES.

1. *The Antitoxin and Vaccine Laboratory.*

The past year has seen the greatest expansion and activity in the history of the Antitoxin and Vaccine Laboratory. The increase in the distribution of biologic products for the past year is shown in the following table:—

	1919.	1920.	1921.	1922.
Diphtheria antitoxin (1,000 unit doses) . . .	170,319	218,227	261,024	336,598
Antimeningococcic serum (15 c.c. vial) . . .	4,547	3,585	3,444	4,332
Antipneumococcic serum (100 c.c. bottle) . . .	621	444	649	725
Smallpox vaccine (doses)	194,807	189,064	197,733	192,218
Bacterial vaccine (1 c.c. doses)	74,123	49,191	55,804	67,550
Schick outfits (doses)	4,400	3,150	54,750	166,600
Diphtheria toxin for Schick test (bulk) . . .	—	—	32	155½
Diphtheria toxin-antitoxin mixture (c.c. doses) .	1,198	3,614	9,414	96,290
Normal serum (c.c.)	—	—	9,788	4,665

The increased distribution of biologic products is due to the greater interest in biologic therapy in general shown by the medical profession, but particularly, in the case of diphtheria antitoxin, Schick outfits and diphtheria toxin-antitoxin, to the intensive educational campaign carried on by the Department. The effect of the greater and more widespread use of these three products is shown by the decreased death and fatality rates for diphtheria.

The physical condition and equipment of the laboratory have been greatly improved, making it possible to handle satisfactorily the large increase in production and distribution and at a comparatively small increase in cost.

More and more the laboratory is fulfilling its desired function as a place of instruction. Foreign students from the International Health Board, students from the School of Public Health and from the Medical School of Harvard University have been given instruction in the production of antitoxins, serums and vaccines, and demonstrations have been given to many student groups. The facilities of the laboratory are now being utilized by students of this school in carrying on investigative work.

The need, forecasted in previous reports, for securing larger and permanent quarters for the work of this laboratory has now become urgent. The marked increase in production, with the augmented laboratory force necessitated, taxes to the utmost the present accommodations. It has therefore become necessary to provide more housing space for the work. Either a sizable addition must be made to the present laboratory building,—provided that its continued occupancy can be assured,—or else a new laboratory building and stable must be erected on some other convenient location. If the Antitoxin and Vaccine Laboratory is to continue to increase its service to the Commonwealth, the question of its adequate housing must be met during the coming year.

2. *The Wassermann Laboratory.*

The work of the Wassermann Laboratory for the year 1922 was characterized by a marked increase in the number of its tests and by the trying conditions under which the work has been accomplished. Seven employees have resigned during the past fourteen months and the entire personnel now consists of only nine workers. The execution of the increased number of regular tests and the training of new personnel at the same time have been difficult. Furthermore, we have had difficulty in obtaining even untrained workers possessing suitable qualifications at salaries which we have been authorized to offer. Unless our salaries are made comparable with those given for similar duties in other institutions, the work

must suffer. This work, because of its peculiar and exacting nature, cannot be done efficiently or reliably with an inferior personnel.

For the past year and a half, rabies has been unusually prevalent among the dogs of Massachusetts. The control of this dread disease depends largely upon the diagnostic procedures carried on in this laboratory. In addition to the establishment of positions carrying sufficiently attractive salary rates to make it possible to secure competent workers, it is also necessary to add an additional stenographer. During the past three years this work has grown from 39,130 to 49,937 tests per year.

DIVISION OF FOOD AND DRUGS.

This Division carries out certain provisions of the laws relating to slaughtering, cold storage, bakeries, soft drink factories, adulteration of milk, food and drugs, examination of liquors, drugs, chemicals and poisons for police authorities, the manufacture of arsphenamine, and during the present year has done considerable work under the mattress law. In addition the Division has made certain analyses for the Department of Correction, and a special investigation for the Attorney General.

Considerable analytical work has been done for various local health departments, the results of the tests being used in the enforcement of the law. Many of these local inspectors have reciprocated by aiding the Department in collecting evidence to be used in court cases. The milk inspectors of Chicopee, North Adams, Pittsfield, Holyoke and Ware have permitted the use of their laboratories on field investigations.

The liquor samples, which showed such an enormous increase last year, have continued to increase. The estimate of the liquor samples for 1922, made one year ago, was 5,000 samples. The actual number examined was 5,766 samples. The indications, however, are that we have reached the maximum during the past five months unless a very unusual increase either in liquor violations or law enforcement takes place.

The bakery inspections show an improvement on the part of many local authorities in carrying out the directions of this Department, and it may be stated that the bakery conditions while not perfect are at present better than ever before in the history of the industry of this State.

The usual examination of eggs made in the fall of the year indicates a considerable improvement in the quality of eggs sold in this State. There have been violations of the law by the sale of eggs two months or more old as fresh eggs, and the sale of storage eggs without advising the customer of that fact, but these violations are becoming less frequent than formerly. The Division is endeavoring to extend this work so that eggs sold under trade designations will correspond in quality to such designations. A number of convictions have already been secured for the sale of eggs under the designation "Hennery Eggs" when such eggs were in fact eggs of considerable age.

As the result of a complaint, an investigation was made of the production of certified milk in this State, which has revealed the fact that such milk is not always of the quality desired. The commissions were not making the necessary inspections to assure the production of milk in accordance with the terms of the contracts with the producers, and in a few instances certified milk was being produced under somewhat unsanitary conditions. This condition has occurred in other States, and in two, at least, the State has been obliged to take over, to some extent, the certification of milk. While this may not be desirable or even necessary in this State, it is advisable that some change take place in the certified milk law so that this Department may be sufficiently represented on each medical milk commission in order that the regulations made by the commission can be adequately enforced.

There have been no unusual extensions of storage of food, except in the case of halibut. There was an unusually large catch late in the season of 1921 at the time when storage halibut was beginning to be consumed. This interfered with

the sale of such fish, and extensions have therefore been granted upon large quantities. The storage reports, however, indicate that notwithstanding the granting of these extensions, there has been considerable halibut removed from storage and sold even during the period when fresh halibut was on the market.

In the investigation of violations of the mattress law practically all the mattress factories of the State have been visited, and a very large percentage were found to be violating the law regarding the marking of mattresses offered for sale with the name of the ingredients used for filling. Each case where violation has been detected has been prosecuted, resulting in conviction in all but a very few instances. The mattress law, however, is somewhat defective, especially relative to the use of second-hand material, and the law should be changed in order to enforce it more efficiently.

In the production of arsphenamine the Division has supplied all the demands made upon it for this drug. During the past year 39,339 doses of arsphenamine computed on a 0.6 gram basis have been manufactured in the laboratory. The capacity of the laboratory is at present above the demand for the article. The amount distributed, however, has been somewhat larger than during the previous fiscal year.

Summary of Samples examined.

	1921.	1922.
Milk	7,103	7,215
Foods	2,560	2,075
Drugs	605	317
Liquor	3,831	5,766
Narcotics, etc.	247	208
Coal	8	14
Totals	14,354	15,595

APPROPRIATIONS AND EXPENDITURES FOR THE YEAR ENDED NOV. 30, 1922.

	Appropriation plus Credits.	Total Appropriation.	Expended.
Division of Administration	\$28,600 00 54 18	\$28,654 18	\$27,972 87
Division of Hygiene	43,700 00 65 72	43,765 72	43,137 80
Maternal and infant hygiene		15,000 00	14,997 97
Division of Communicable Diseases	79,370 00 6 20	79,376 20	76,489 49
Penikese Hospital	1,500 00 126 00	1,626 00	1,550 00
Subdivision of Venereal Diseases	32,300 00 3,318 98	35,618 98	29,395 76
Division of Tuberculosis		18,000 00	17,747 16
Subsidies to cities and towns		156,555 22	156,549 52
Tuberculosis investigation		3,000 00	245 90
Division of Food and Drugs		42,600 00	42,374 66
Manufacture and distribution of arsphenamine	21,820 00 1,037 96	22,857 96	19,705 14
Division of Biologic Laboratories:			
Antitoxin and Vaccine Laboratory		60,100 00	60,051 30
Wassermann Laboratory		15,208 58	14,896 89
Division of Water and Sewage Laboratories	36,625 00 112 05	36,737 05	35,626 23
Division of Sanitary Engineering		53,950 00	52,262 86
Salem and Peabody sewerage		10,000 00	4,054 65
Lawrence and Methuen water supply		5,500 00	1,812 89
Neponset valley fund		169 53	14 00
Neponset valley, apportionment and assessment of real estate betterments		7,650 00	235 00
Restoration rights of way		4,500 00	252 91
Examiners of Plumbers		5,000 00	4,598 66
Totals		\$645,869 42	\$603,971 66

EXPENDITURES OF TUBERCULOSIS SANATORIA FOR THE YEAR ENDED NOV. 30,
1921.

	Rutland.	Lakeville.	Westfield.	North Reading.	Totals.
Appropriation for maintenance	\$346,754 16	\$209,405 18	\$190,050 00	\$171,263 24	\$917,472 58
Personal services	\$133,195 45	\$91,907 49	\$87,617 86	\$67,925 29	\$380,646 09
Religious instruction	1,850 00	1,288 10	1,214 60	1,600 00	5,952 70
Travel, transportation and office expenses	3,529 38	2,689 46	2,279 78	1,889 02	10,387 64
Food	78,421 92	27,317 22	33,173 35	43,846 60	182,759 09
Clothing and materials	241 52	5 74	761 53	217 76	1,226 55
Furnishings and household supplies	8,997 14	7,600 22	9,401 60	5,970 57	31,969 53
Medical and general care	9,918 18	4,608 53	2,817 92	3,747 41	21,092 04
Heat, light and power	40,885 30	20,300 85	21,828 90	13,723 01	96,738 06
Farm	17,228 84	30,672 74	13,596 95	7,021 02	68,519 55
Garage, stable and grounds	3,821 92	5,675 84	3,903 34	2,191 18	15,592 28
Repairs, ordinary	8,542 35	7,233 22	9,936 12	3,290 15	29,001 84
Repairs and renewals	5,649 20	3,037 02	3,496 09	5,220 16	17,412 47
Total expenditures	\$312,281 20	\$202,236 43	\$190,028 04	\$156,642 11	\$861,187 78
Unexpended balance	\$34,472 96	\$7,168 95	\$21 96	\$14,621 13	\$56,285 00
Average number of inmates	346	236	262	182	
Weekly per capita cost	\$17 34	\$16 41	\$13 89	\$16 49	
Receipts for board of inmates	\$57,488 07	\$43,201 94	\$47,377 49	\$31,902 94	\$179,970 44
Receipts from sales	600 25	651 50	424 83	452 83	2,129 41
Total receipts	\$58,088 32	\$43,853 44	\$47,802 32	\$32,355 77	\$182,099 85

EXPENDITURES OF TUBERCULOSIS SANATORIA FOR THE YEAR ENDED NOV. 30,
1922.

	Rutland.	Lakeville.	Westfield.	North Reading.	Totals.
Appropriation for maintenance	\$289,569 36	\$192,666 62	\$179,700 00	\$149,946 37	\$811,882 35
Personal services	\$133,884 04	\$94,843 07	\$83,127 25	\$70,687 71	\$382,342 07
Religious instruction	1,800 00	1,263 20	1,164 60	1,585 17	5,812 97
Travel, transportation and office expenses	3,448 12	2,252 10	2,480 34	1,945 99	10,126 55
Food	69,305 71	24,671 08	29,720 01	40,097 44	163,794 24
Clothing and materials	166 81	6 09	1,350 18	162 47	1,685 55
Furnishings and household supplies	8,988 11	6,587 30	8,707 19	4,767 43	29,050 03
Medical and general care	9,418 00	4,322 93	3,819 07	3,692 86	21,252 86
Heat, light and power	20,951 52	18,158 49	14,753 28	9,396 46	63,259 75
Farm	13,893 45	24,396 98	12,087 86	4,791 29	55,169 58
Garage, stable and grounds	2,988 08	3,146 67	3,327 53	3,912 25	13,374 53
Repairs, ordinary	8,448 14	7,299 74	9,410 38	3,040 22	28,198 48
Repairs and renewals	7,620 76	4,394 30	9,672 87	2,321 87	24,009 80
Total expenditures	\$280,912 74	\$191,341 95	\$179,620 56	\$146,401 16	\$798,276 41
Unexpended balance	\$8,656 62	\$1,324 67	\$79 44	\$3,545 21	\$13,605 94
Average number of inmates	355	243	265	193	
Weekly per capita cost	\$15 20	\$15 13	\$13 02	\$14 58	
Receipts for board of inmates	\$95,304 73	\$31,886 97	\$40,783 22	\$29,211 30	\$196,686 22
Receipts from sales	1,382 72	780 27	1,597 29	493 33	3,253 61
Total receipts	\$96,687 45	\$32,167 24	\$42,380 52	\$29,704 63	\$199,939 83

EUGENE R. KELLEY,
Commissioner of Public Health.

REPORT OF DIVISION OF SANITARY ENGINEERING.

OVERSIGHT AND CARE OF INLAND WATERS.

Water Supply and Sewerage.

The Department received during the year 1922 a total of 204 applications for its advice upon matters relating to water supply, sewerage and sewage disposal or for the approval of plans of such works under general and special acts of the Legislature relating thereto. Of these applications, 149 related to water supply, 11 to sources of ice supply, 18 to sewerage, drainage and sewage disposal, 9 to pollution of streams, and 17 to miscellaneous matters.

In the year 1922 no new water supplies were introduced into any of the towns of the State and, in fact, water works construction has been restricted in the past 7 years to meeting pressing needs of additional supplies in towns already provided with water works systems, and in only 2 towns formerly unprovided with water works has a water supply been introduced. There are many of the smaller towns in the State in which a water supply is very badly needed, a considerable number of which had a population in excess of 2,000 by the census of 1920. In such towns and in the larger villages having no public water supply the inhabitants are compelled to depend upon local wells or springs which as a rule become badly polluted by the disposal of sewage in the immediate neighborhood of the wells from which the water supplies are drawn.

The total number of cities and towns in the State supplied with water has been the same as in the year 1921, but the number of towns has been diminished by one due to the fact that the town of Gardner became a city on March 6, 1922. Of the 39 cities and 316 towns in the State, 217 are supplied with water in whole or in part from public works, about 20 per cent of which are owned by private companies. The aggregate population of the cities and towns having public water supplies was, by the census of 1920, 3,702,549.

Water Supply Needs and Resources.

A report by this Department, jointly with the Metropolitan District Commission, upon the water supply needs and resources of the State was presented to the Legislature early in 1922 and printed as House Document No. 1550. This report presents fully the water supply situation in the larger part of the State and recommends additional sources of supply for the Metropolitan District, including also the city of Worcester, and for the cities and towns of southeastern Massachusetts. In that report the circumstances affecting the Metropolitan water supply, the safe yield of the sources, the quality of their waters and the probable demands upon them were fully presented, including circumstances affecting other cities and towns in the neighborhood of the Metropolitan Water District or in the region from which its supplies are drawn. The report also reviewed fully the conditions affecting the water supplies of cities and towns in southeastern Massachusetts and in certain other parts of the State and recommended an investigation of the water supply situation in the cities and towns of the Merrimack River valley and in southern Essex County, the latter of which draw their supplies chiefly or in part from the watershed of the Ipswich River. Action on the main portions of this report was postponed to the next Legislature, and a resolve was passed directing the investigation of a water supply for Lawrence and Methuen which has been in progress during the latter part of the year.

The water supply situation in many places in the State is one requiring immediate attention if the danger of a water famine and its inevitable results are to be avoided.

The quantity of water consumed in Massachusetts cities and towns has increased constantly with few exceptions since water supplies were first introduced. The excessive use and waste of water from public water works systems, which was the common experience of earlier years, have been largely prevented by the general introduction of meters, and in the great majority of cities and towns in the State all or the greater part of the water supplied to consumers is delivered through meters.

The adoption of the meter system checked the increase in the consumption of water and in many cases where waste was large the consumption was reduced for longer or shorter periods; but while the general use of meters checked the unnecessary use and largely prevented the waste of water from public works, the consumption of water, after the effect of the introduction of meters had passed, began again to increase and has continued to increase with the growth of the communities and at a somewhat greater rate than the growth of population, a condition due in part in many cases to greater industrial requirements and generally no doubt to a gradually improving standard of living. An indication of the approximate amount of this increase in communities in which the water is supplied generally through meters is furnished by a study of the water consumption records in communities in which water services have been quite fully metered for a considerable period of years.

From available records it appears that in 24 cities and towns outside the Metropolitan District having an aggregate population of 795,580 by the census of 1920, and in which more than 95 per cent of the services have been metered throughout the 15 years which ended with 1921, the consumption of water increased from 33,607,000 gallons per day to 51,038,000 gallons per day, an increase of 51.9 per cent, or 3.5 per cent per year. It is also possible to compare the increase in the consumption of water in 38 cities and towns having a population in excess of 5,000 outside the Metropolitan Water District for the years 1915 to 1921, years in which business and meteorological conditions are fairly comparable. In these cities and towns, having an aggregate population in 1920 of 1,232,291, the percentage of metered services in 1915 exceeded 93 per cent, and in 1921 exceeded 95 per cent. The increase in consumption of water in these cities for this period of 6 years has been 19.2 per cent, or 3.2 per cent per year. The daily per capita consumption in this group of municipalities increased in that period one gallon per person per year.

As a result of this constant increase, the quantity of water drawn from the available sources of water supply in many places in the State is closely approaching or has already equalled or exceeded the amount which these sources can safely be depended upon to supply in one of those inevitable periods of drought which have produced such serious consequences in the past. This fact, not unnoted by water works authorities familiar with the condition and capacity of their sources of water supply, has not received the attention it requires for various reasons. No doubt the gradually increasing rainfall for the past 10 years or more, which in recent years has become excessive and which has steadily and very greatly increased the yield of watersheds, has prevented visible evidence of approaching inadequacy and made postponement of necessary additions appear to be a safe course under the circumstances. The great cost of water works construction and the desire to avoid expenditures for any purpose at the present time have also been important factors in causing the postponement of necessary improvements in communities in which the danger of shortage is realized. In some of the cities and towns located in the neighborhood of the Metropolitan water works or its sources of water supply, dependence is placed naturally upon the Metropolitan water system for the additional water that may be required in case of emergency which the district must furnish in compliance with the provisions of the Metropolitan water act. Consequently no action is deemed necessary by these communities to provide further means of meeting the requirements of a period of drought.

How long the present period of excessive rainfall will continue to produce unusual yields of watersheds it is impossible to predict. The records of the actual flow of the Sudbury River and of the North Branch of the Nashua River, taken together, give a continuous record of flow of streams near the central part of the State for a period of nearly half a century. A study of the progressive average variations

in the flows of these rivers for 3-year periods for the past 48 years shows that peaks of maximum stream flow rising to approximately equal amounts have alternated with periods of minimum flow in which the yield of watersheds has fallen to a quantity much less than the average and in each case to approximately the same level. The period which elapsed between the peak flows in former years and the following drought has ranged from 4 to 8 years.

It is impossible of course to predict the rainfall of the future. For a period of 11 years the stream flow resulting from the rainfall has been steadily increasing and had reached in 1922 the average maximum reached in previous wet periods in the last half century. How long the flow will remain at the maximum or how soon a decline will begin cannot be estimated, but prudence in guarding against danger of shortage of water for public water supply purposes requires that preparation for the probable contingency of a dry period be made in sufficient season.

It is a small matter in most cases to provide the additional quantity of water required for a small town or village in season to avoid the effects of a drought, but such is not the case with larger communities and especially with the great aggregates of population found in the larger cities. Works for the supply of such communities may require many months and even many years for construction and the needs of such communities must be anticipated in season to make suitable preparation to provide for them. The water supplies of many of the cities and towns of the State will inevitably prove inadequate unless largely increased at the coming of the next dry period and in some cases even with the return of years of average rainfall. Due regard for the public safety and the public health require that the necessary preliminary steps be taken early enough to insure the provision of an adequate water supply to meet such a contingency.

THE SANITARY PROTECTION OF PUBLIC WATER SUPPLIES.

Under the provisions of Chapter 111 of the General Laws, rules and regulations were established by the Department during the past year for the sanitary protection of the water supply of the town of Ashburnham and for the water supply of the Medfield State Hospital; and rules and regulations were re-established for the sanitary protection of the water supplies of Peabody and Westfield, the question having arisen as to whether the rules had been properly adopted at an earlier date. Rules and regulations had been adopted by the Department for the protection of the water supplies of the following cities, towns and districts up to the end of the fiscal year 1922:—

Abington & Rockland
Adams
Amherst
Andover
Ashburnham
Attleboro
Braintree
Brockton & Whitman
Cambridge
Chester
Chicopee
Concord
Dalton
Danvers & Middleton
Easthampton
Fall River
Falmouth
Fitchburg
Gardner
Great Barrington (Housatonic)
Greenfield
Haverhill
Hingham and Hull

Holden
Holyoke
Hudson
Lee
Leicester (Cherry Valley & Rochdale)
Leominster
Lincoln & Concord
Lynn
Marlborough
Maynard
Medfield (State Hospital)
Montague
Newburyport
Northampton
North Andover
Northborough
Norwood
Peabody
Pittsfield
Plymouth
Randolph & Holbrook
Rockport
Russell

Rutland
Salem & Beverly
Springfield
Springfield & Ludlow
Stockbridge
Taunton
Wakefield

Westfield
West Springfield
Weymouth
Williamsburg
Winchester
Worcester

EXAMINATION OF SEWER OUTLETS DISCHARGING INTO THE SEA.

During the year the matter of discharging sewage from certain thickly settled sections of the town of Hull into Weir River or Hingham Bay was again brought to the attention of the Department. This method of disposal was approved by the Department in 1914 and after a hearing held during the past year the Department again approved the proposed outlet into the Weir River for temporary use for a period not exceeding five years.

Special examinations have been made during the year of the sewer outlet for the sewage of Salem and Peabody near Great Haste Island in Salem Harbor and information relative to this outlet appears in a special document. Special examinations have also been made of the New Bedford sewer outlet and this was found to be operating satisfactorily. Very little change has been made in the conditions surrounding the other main sewer outlets discharging into the sea or tidal estuaries, some of which are highly objectionable, but the outlets discharging into deep water continue to be satisfactory.

NUISANCES FROM NOXIOUS TRADES.

During the past year this Division has been called upon to devote a great amount of time to the investigation of nuisances due to odors escaping from certain noxious trades, particularly oil refineries treating Mexican crude oils. The most important case of this kind has been that relative to the Massachusetts Oil Refining Company at East Braintree. The Public Health Council held a final hearing relative to this matter early in the year and on March 28th ordered the company to desist from the further carrying on of the processes of the distillation of oils on its premises at East Braintree. The company immediately appealed to the Superior Court for a jury trial under the statute and also requested that the Department specially authorize the continuation of the processes pending the trial. Upon the advice of the Attorney General, the Department authorized the company to continue its operations. It was expected that the matter would be tried at the May session but the trial was subsequently postponed until October. In the meantime, a large mass of evidence was secured by representatives of the Department under the direction of the Attorney General.

Subsequently, upon the advice of the Attorney General an agreed verdict was presented to the Norfolk County Superior Court on November 14th and was brought in by the Jury. The verdict is as follows:

Copy

Commonwealth of Massachusetts

NORFOLK, SS.

SUPERIOR COURT
No. 13055

MASSACHUSETTS OIL REFINING COMPANY, *Petitioner,*

v.

THE DEPARTMENT OF PUBLIC HEALTH *et al., Respondents.*

VERDICT.

The jury alter the order of the Department of Public Health dated March 28, 1922, as follows:

The Massachusetts Oil Refining Company shall be permitted to continue to carry on the business of the distillation of oils on the premises now occupied by it in that

part of the Town of Braintree known as East Braintree under the following restrictions and conditions:

(1) The Company shall complete the separator now under construction at an estimated total cost of forty thousand dollars (\$40,000) and, if after reasonable trial said separator proves to be inadequate for the reasonably complete removal of oil, it shall thereupon be enlarged or, if necessary, remodeled or rebuilt by said Company so as to be reasonably satisfactory to said Department of Public Health.

(2) The Company shall complete the repairs and a partial renewal of its gas holder at an estimated total cost of eleven thousand dollars (\$11,000), the work to be so completed that the gas holder shall be reasonably satisfactory to the said Department of Public Health.

(3) The Company shall complete the installation in the pipes of its non-condensable gas collecting system of specially designed lubricated valves at an estimated total cost of thirty-five hundred dollars (\$3,500), the work to be so completed that the non-condensable gas collecting system shall be reasonably satisfactory to the said Department of Public Health.

(4) The Company shall complete the repairs of its vapor-collecting pipe lines and as a part thereof shall install an additional exhaust fan at an estimated total expense of two thousand dollars (\$2,000), the work to be so completed that the vapor-collecting pipe lines and exhaust fan shall be reasonably satisfactory to the said Department of Public Health.

(5) The Company shall before the resumption of its business of the distillation of oils on its said premises, except as hereinafter provided, expend in addition to the expenditures called for by the four preceding paragraphs hereof:

(A) At least one hundred thousand dollars (\$100,000) for the purchase, construction and installation of machinery, equipment, devices and appliances to eliminate and prevent objectionable odors and the escape of oil from said premises; said machinery, equipment, devices and appliances to be subject in design, construction, materials, installation and every other respect to the approval of the said Department of Public Health (or its representative) and a representative to be selected by the said Company, and in case said representatives or said Department and said representative of the Company shall be unable to agree then subject to the approval of such competent disinterested third party as the said representatives or said Department and said representative of the Company shall in writing appoint.

(B) Such part of fifty thousand dollars (\$50,000) in addition to the sum referred to in paragraph (5), subparagraph (A) hereof, for the purchase, construction and installation of machinery, equipment, devices and appliances to eliminate and prevent objectionable odors and the escape of oil from said premises as may be determined to be reasonably necessary by the said Department of Public Health (or its representative) and a representative to be selected by the said Company, and in case they shall be unable to agree then such part of said last named fifty thousand dollars (\$50,000) as shall be determined to be reasonably necessary by a competent disinterested third party appointed in writing by said representatives or by said Department and said representative of the Company. Any sums expended under paragraph (5), subparagraph (B) hereof, shall be for the purchase, construction and installation of machinery, equipment, devices and appliances to eliminate and prevent objectionable odors and the escape of oil from said premises, all of which shall be subject in design, construction, materials, installation and in every other respect to the approval of the said Department of Public Health (or its representative) and a representative to be selected by the said Company, and in case said representatives or said Department and said representative of the Company shall be unable to agree then subject to the approval of such competent disinterested third party as the said representatives or said Department and said representative of the Company shall in writing appoint.

Said Company shall not resume its business of the distillation of oils or any part thereof on its said premises until everything required by paragraphs one to five inclusive hereof has been fully completed, except to such extent and for such period or periods of time as said Department of Public Health may from time to time specially authorize.

(6) All of the machinery, equipment, devices and appliances purchased, installed or constructed by the said Company in accordance with the provisions of the preceding paragraphs hereof shall thereafter be maintained and operated by it in an efficient and proper manner by competent officers, employees and servants of said Company and with a view of preventing and eliminating objectionable odors on and about said premises and the escape of oil from said premises.

(7) If the services of a disinterested third party are required to carry out any of the provisions of paragraph five hereof, his compensation and expenses, if any, shall be borne equally by said Company and said Department of Public Health.

(8) The permission hereby granted shall, subject to the restrictions and conditions hereby imposed, be construed to include the temporary receiver of said Company appointed by the Superior Court for Suffolk County November 1, 1922, any permanent receiver of said Company who may be hereafter appointed, any successor corporation of said Company and any successor to the right to occupy said premises.

(9) Nothing herein contained shall be construed as preventing said Department of Public Health from making such further orders in the premises under the provisions of Section 152, Chapter 111 of the General Laws of Massachusetts as in the judgment of the said Department the public health, comfort or convenience require.

(Signed) WILLIAM B. MARQUIS,
Foreman.

This verdict is accepted by the Court, neither party to recover damages or costs.

GEORGE A. FLYNN (Signed)
J. S. C.

The operation of the works had not been resumed at the end of the year.

An application for action by the Department on the matter of the Beacon Oil Company at Everett was heard by the Public Health Council on May 9th. The company has installed various devices for preventing the escape of foul odors and a great improvement in conditions had been effected at the end of the year.

The matter is still under consideration.

IMPROVEMENT OF THE NEPONSET RIVER.

An appropriation of \$4,500.00 was made by the Legislature in 1922 for the restoration of certain rights of way in the Fowl Meadows on the Neponset River by the construction of two bridges, made necessary by the work done under authority of Chapter 655 of the Acts of the year 1911 in improving the sanitary condition of the river. Under this appropriation a contract was awarded by the Department on September 19, 1922, to the Wm. L. Miller Company of Boston, Mass., and construction is now in progress and will probably be completed early in 1923.

The commission appointed by the Supreme Judicial Court during the latter part of 1921, in response to an application of the Department, to determine what proportion of one-half of the total expense incurred under the provisions of Chapter 655 of the Acts of the year 1911, entitled "An Act Relative to the Protection of the Public Health in the Valley of the Neponset River," and acts in addition thereto, shall be paid by the various towns mentioned in said acts, has held one public hearing and taken a general view of the lands under consideration.

EXAMINATION OF PUBLIC WATER SUPPLIES.

The public water supplies of the State have been examined as usual during the year by the engineers of this Division, and samples of the waters of the various sources have been analyzed chemically and microscopically, the latter in the case of surface waters, while bacterial examinations have been made of those waters where such tests appeared to be necessary or desirable. The following are the average yearly results of chemical analyses of samples of water from public sources examined in 1922:

ANALYSES OF THE WATER OF PUBLIC WATER SUPPLIES.

Averages of Chemical Analyses of Surface-water Sources for the Year 1922.

[Parts in 100,000.]

CITY OR TOWN.	Source.	Color.	Residue on Evapo- ration.	AMMONIA.			Chlorine.	Hardness.	
				Free.	ALBUMINOID.				
					Total.	Suspended.			
Metropolitan Water Dis- trict	Wachusett Reservoir, upper end	.26	3.84	.0023	.0114	.0021	.23	1.3	
	Wachusett Reservoir, lower end	.13	3.40	.0015	.0091	.0016	.23	1.2	
	Sudbury Reservoir	.16	3.99	.0025	.0113	.0017	.27	1.5	
	Framingham Reservoir No. 3	.16	4.15	.0027	.0108	.0022	.28	1.6	
	Hopkinton Reservoir	.55	4.86	.0015	.0127	.0023	.34	1.5	
	Ashland Reservoir	.64	4.77	.0019	.0136	.0017	.28	1.5	
	Framingham Reservoir No. 2	.83	6.97	.0062	.0171	.0028	.68	2.0	
	Lake Cochituate	.17	7.03	.0010	.0176	.0056	.63	2.6	
	Chestnut Hill Reservoir	.15	3.93	.0015	.0107	.0021	.28	1.5	
	Weston Reservoir	.16	4.10	.0015	.0099	.0017	.29	1.5	
	Spot Pond	.07	3.90	.0013	.0108	.0021	.29	1.4	
	Tap in State House	.16	3.88	.0010	.0094	.0015	.29	1.7	
	Tap in Revere	.07	3.95	.0008	.0093	.0016	.29	1.6	
	Tap in Quincy	.14	4.11	.0009	.0085	.0012	.30	1.5	
	Abington	Big Sandy Pond	.05	3.69	.0040	.0099	.0017	.69	0.9
	Adams (Fire District)	Dry Brook	.24	6.99	.0014	.0072	.0011	.12	4.4
	Amherst	Bassett Brook	.01	3.89	.0014	.0038	.0006	.12	2.5
Amethyst Brook large reservoir		.58	3.94	.0032	.0105	.0019	.14	0.9	
Andover	Amethyst Brook small reservoir	.18	3.71	.0022	.0087	.0012	.16	1.0	
	Haggett's Pond	.14	4.29	.0020	.0114	.0018	.35	1.8	
Ashburnham	Upper Naukeag Lake	.05	2.69	.0012	.0057	.0007	.15	0.7	
Ashfield	Bear Swamp Brook	.20	5.32	.0007	.0060	.0005	.18	3.1	
Athol	Phillipston Reservoir	.84	4.87	.0045	.0260	.0074	.17	1.3	
Barre	Buckman Brook Reservoir	.21	3.48	.0013	.0114	.0016	.12	0.9	
	Thousand Acre Meadow Brook	1.85	5.94	.0024	.0224	.0043	.16	1.6	
	Inlet of filter	.34	3.58	.0028	.0118	.0016	.12	1.0	
	Outlet of filter	.37	3.76	.0034	.0117	.0028	.14	1.1	
Blandford (Fire Dis- trict)	Reservoir	.13	4.02	.0076	.0117	.0030	.15	1.2	
BROCKTON	Freeland Brook	.02	3.55	.0005	.0024	.0004	.30	1.6	
	Silver Lake	.10	3.40	.0013	.0090	.0019	.54	0.8	
CAMBRIDGE	Lower Hobbs Brook Reservoir	.18	5.64	.0032	.0169	.0033	.35	2.2	
	Upper Hobbs Brook Reservoir	.42	6.09	.0043	.0197	.0034	.35	2.3	
Cheshire	Stony Brook Reservoir	.46	6.75	.0040	.0162	.0023	.44	2.5	
	Fresh Pond	.25	6.48	.0056	.0167	.0041	.51	3.0	
	Thunder Brook	.03	8.75	.0020	.0028	.0004	.12	6.0	
	Kitchen Brook	.01	7.15	.0010	.0024	.0004	.11	4.9	
Chester (Fire District) .	Austin Brook Reservoir	.15	4.15	.0006	.0038	.0006	.12	1.6	
	Horn Pond	.21	4.95	.0042	.0106	.0006	.10	1.8	
CHICPEE	Morton Brook	.05	4.42	.0022	.0036	.0008	.21	1.3	
	Cooley Brook	.41	4.70	.0038	.0072	.0009	.18	1.4	
Clinton	Tap in town	.16	3.27	.0008	.0081	.0015	.12	1.2	
Colrain (Griswoldville)	McClellan Reservoir	.06	7.67	.0009	.0060	.0004	.15	4.9	
Concord	Nagog Pond	.03	2.74	.0021	.0091	.0012	.36	0.9	
Dalton (Fire District) .	Scott Reservoir	.18	3.31	.0013	.0074	.0013	.11	1.1	
	Egypt Brook Reservoir	.46	5.55	.0036	.0198	.0102	.10	2.7	
	Windsor Reservoir	.21	4.90	.0010	.0077	.0013	.10	2.4	
	Cady Brook	.53	4.47	.0027	.0177	.0036	.31	1.7	
Danvers	Middleton Pond	.38	4.57	.0025	.0163	.0031	.30	1.6	
	Swan Pond								
Deerfield (South Deer- field Water Supply District)	Roaring Brook	.00	5.25	.0004	.0030	.0002	.10	4.3	
	North Watuppa Lake	.14	3.96	.0018	.0121	.0021	.48	1.2	
FALL RIVER	Long Pond	.03	3.47	.0008	.0070	.0013	.94	0.6	
Falmouth	Meetinghouse Pond	.07	2.66	.0036	.0137	.0023	.15	1.0	
FITCHBURG	Scott Reservoir	.10	3.68	.0060	.0142	.0036	.21	1.0	
	Wachusett Lake	.09	2.88	.0028	.0137	.0012	.17	0.9	
Gardner	Falulah Brook	.13	3.24	.0038	.0090	.0020	.19	0.7	
	Ashby Reservoir	.29	3.02	.0079	.0171	.0034	.16	0.6	
	Crystal Lake	.07	5.43	.0031	.0107	.0011	.30	2.2	
	Dike's Brook Reservoir	.30	3.88	.0026	.0092	.0013	.66	0.4	
GLOUCESTER	Wallace Reservoir	.81	4.91	.0026	.0154	.0030	.78	0.8	
	Haskell Brook Reservoir	.19	3.63	.0023	.0082	.0017	.60	0.7	

Averages of Chemical Analyses of Surface-water Sources, etc. — Continued.

[Parts in 100,000.]

CITY OR TOWN.	Source.	Color.	Residue on Evapo- ration.	AMMONIA.			Chlorine.	Hardness.
				Free.	ALBUMINOID.			
					Total.	Suspended.		
Great Barrington (Fire District)	East Mountain Reservoir	.08	5.83	.0029	.0083	.0018	.14	3.8
	Green River	.00	8.94	.0010	.0047	.0010	.13	8.8
G r e a t Barrington (Housatonic)	Long Pond	.05	7.51	.0032	.0158	.0028	.12	6.4
Greenfield	Glen Brook Upper Reservoir	.04	5.00	.0020	.0056	.0010	.15	3.3
	Glen Brook Lower Reservoir	.04	5.95	.0033	.0067	.0011	.16	3.5
Hadley (Water Supply District)	Hart's Brook Reservoir	.08	4.90	.0022	.0063	.0018	.18	2.0
Hatfield	Running Gutter Brook Reservoir	.15	5.35	.0006	.0040	.0002	.18	2.6
HAVERHILL	Johnson's Pond	.20	5.40	.0031	.0125	.0021	.50	2.6
	Crystal Lake	.15	3.90	.0014	.0114	.0020	.31	1.4
	Kenoza Lake	.13	5.27	.0019	.0162	.0041	.41	2.3
	Lake Saltonstall	.04	5.99	.0033	.0135	.0027	.53	2.6
	Pentucket Lake	.09	4.80	.0025	.0144	.0028	.41	2.1
	Millvale Reservoir	.68	5.89	.0028	.0168	.0030	.37	2.0
Hingham	Accord Pond	.18	4.00	.0012	.0100	.0019	.51	0.7
	Fulling Mill Pond	.71	5.77	.0048	.0200	.0067	.62	1.7
Hinsdale (Fire District)	Reservoir	.12	2.17	.0008	.0059	.0008	.10	1.1
HOLYOKE	Whiting Street Reservoir	.05	5.30	.0030	.0106	.0016	.21	2.8
	Pomer Reservoir	.32	3.62	.0021	.0107	.0015	.14	1.5
	Wright and Ashley Pond	.08	5.22	.0032	.0134	.0025	.17	2.5
	High Service Reservoir	.08	4.50	.0042	.0139	.0022	.18	2.1
	White Reservoir	.24	3.95	.0067	.0154	.0024	.15	1.6
	Gates Pond	.13	3.54	.0032	.0121	.0015	.21	1.4
Hudson								
Huntington (Fire District)	Cold Brook Reservoir	.10	3.32	.0005	.0048	.0004	.14	1.3
Ipswich	Dow's Brook Reservoir	.25	5.05	.0041	.0152	.0018	.60	1.7
LAWRENCE	Merrimack River, filtered	.43	6.20	.0057	.0086	—	.46	1.1
Lee	Codding Brook Upper Reservoir	.09	4.29	.0006	.0065	.0006	.13	1.9
	Codding Brook Lower Reservoir	.09	4.12	.0008	.0061	.0007	.11	1.8
	Basin Pond Brook	.49	4.34	.0012	.0114	.0014	.13	1.5
Lenox	Reservoir	.04	8.01	.0010	.0057	.0014	.11	6.2
	Laurel Lake	.08	12.00	.0138	.0154	.0022	.22	11.1
LEOMINSTER	Morse Reservoir	.18	2.81	.0036	.0088	.0012	.16	0.5
	Haynes Reservoir	.20	2.88	.0055	.0114	.0026	.16	0.5
	Fall Brook Reservoir	.11	2.82	.0032	.0084	.0007	.17	0.5
Lincoln	Sandy Pond	.07	4.25	.0034	.0101	.0020	.31	1.1
Longmeadow	Cooley Brook	.05	5.16	.0025	.0069	.0016	.23	2.5
LYNN	Birch Reservoir	.11	4.87	.0038	.0130	.0021	.59	2.0
	Breed's Reservoir	.23	5.64	.0057	.0135	.0018	.59	2.4
	Walden Reservoir	.34	6.14	.0041	.0141	.0024	.60	2.5
	Hawkes Reservoir	.47	6.90	.0038	.0173	.0024	.59	2.9
Manchester	Gravel Pond	.12	4.51	.0014	.0095	.0011	.67	0.9
MARLBOROUGH	Lake Williams	.08	5.25	.0028	.0141	.0028	.47	2.2
	Milham Brook Reservoir	.58	5.53	.0082	.0158	.0029	.34	1.6
Maynard	White Pond	.22	3.48	.0010	.0086	.0012	.27	0.9
Milford	Charles River, filtered	.14	4.55	.0007	.0060	—	.33	2.0
Montague ¹	Lake Pleasant	.01	—	.0014	.0064	—	.14	0.6
Nantucket	Wannacomet Pond	.10	6.98	.0026	.0145	.0044	2.08	2.0
NEW BEDFORD	Little Quittacas Pond	.36	4.00	.0019	.0128	.0021	.42	1.0
	Great Quittacas Pond	.52	4.16	.0020	.0125	.0017	.44	0.8
NEWBURYPORT	Artichoke River	.34	6.36	.0062	.0229	.0039	.50	2.5
NORTH ADAMS	Notch Brook Reservoir	.01	6.99	.0023	.0055	.0013	.10	6.6
	Broad Brook	.10	4.26	.0023	.0054	.0011	.10	2.1
	Beamman Reservoir	.02	6.99	.0037	.0066	.0010	.09	5.1
NORTHAMPTON	Middle Reservoir	.24	4.96	.0032	.0086	.0011	.15	1.8
	Mountain Street Reservoir	.10	4.33	.0015	.0054	.0010	.12	2.0
North Andover	Great Pond	.15	4.83	.0034	.0122	.0008	.42	2.1
Northborough	Lower Reservoir	.77	4.67	.0048	.0147	.0026	.27	1.3
	Upper Reservoir	.79	4.75	.0038	.0156	.0031	.25	1.4
Northbridge	Cook Allen Reservoir	.00	3.11	.0002	.0024	.0002	.20	0.7
North Brookfield	Doane Pond	.49	4.17	.0090	.0232	.0060	.19	1.2
	North Pond	.43	3.66	.0084	.0187	.0053	.14	0.8
Northfield	Reservoir	.32	3.40	.0010	.0071	.0004	.12	0.5

¹ Supply for Turners Falls Fire District, Millers Falls Water Supply District and Lake Pleasant Water Supply District.

Averages of Chemical Analyses of Surface-water Sources, etc. — Concluded.

[Parts in 100,000.]

CITY OR TOWN.	Source.	Color.	Residue on Evapo- ration.	AMMONIA.			Chlorine.	Hardness.
				Free.	ALBUMINOID.			
					Total.	Suspended.		
Norwood	Buckmaster Pond . . . .	.18	4.32	.0088	.0162	.0032	.45	1.4
Orange	Reservoir . . . .	.03	3.27	.0005	.0030	.0002	.13	1.1
Palmer (Fire District No. 1)	Lower Reservoir . . . .	.21	3.60	.0014	.0088	.0014	.14	0.6
PEABODY	Spring Pond . . . .	.28	5.57	.0143	.0133	.0024	.67	2.4
	Suntaug Lake . . . .	.03	5.08	.0103	.0137	.0018	.82	2.3
PITTSFIELD	Ashley Lake . . . .	.15	4.63	.0025	.0116	.0022	.11	2.9
	Ashley Brook . . . .	.14	7.29	.0021	.0088	.0019	.12	5.8
	Hathaway Brook . . . .	.03	9.46	.0006	.0043	.0007	.12	8.8
	Mill Brook . . . .	.38	5.71	.0014	.0126	.0020	.11	2.1
	Sackett Brook . . . .	.23	7.74	.0009	.0057	.0003	.13	5.5
	Farnham Reservoir . . . .	.57	5.32	.0055	.0174	.0036	.13	1.8
Plymouth	Little South Pond . . . .	.01	2.94	.0031	.0098	.0008	.64	0.2
	Great South Pond . . . .	.00	3.29	.0031	.0097	.0015	.63	0.4
Randolph	Great Pond . . . .	.49	5.01	.0015	.0147	.0022	.48	1.6
Rockport	Cape Pond . . . .	.36	9.74	.0082	.0179	.0035	3.39	1.9
Russell	Black Brook . . . .	.26	3.72	.0004	.0064	.0006	.13	1.3
Rutland	Muschopauge Lake . . . .	.01	3.57	.0015	.0071	.0015	.27	1.1
SALEM	Wenham Lake . . . .	.38	7.35	.0101	.0165	.0026	.78	2.6
	Longham Reservoir . . . .	.90	7.08	.0119	.0189	.0029	.77	1.9
	Ipswich River at pumping station	1.03	11.37	.0071	.0155	.0028	.71	4.4
Shelburne (Shelburne Falls Fire District)	Fox Brook . . . .	.02	6.13	.0003	.0034	—	.10	3.3
Southbridge	Hatchet Brook Reservoir No. 3 . . . .	.22	3.44	.0017	.0111	.0023	.15	1.1
	Hatchet Brook Reservoir No. 4 . . . .	.20	3.33	.0023	.0138	.0035	.15	0.8
South Hadley (Fire District No. 1)	Leaping Well Reservoir . . . .	.06	3.47	.0033	.0106	.0036	.17	1.2
	Buttery Brook Reservoir . . . .	.21	5.05	.0042	.0098	.0023	.27	1.5
Spencer	Shaw Pond . . . .	.06	2.57	.0008	.0117	.0022	.18	0.8
SPRINGFIELD	Westfield Little River, filtered . . . .	.13	3.91	.0005	.0056	—	.14	1.4
Stockbridge	Lake Averic . . . .	.08	6.51	.0022	.0109	.0010	.14	5.6
Stoughton	Muddy Pond Brook . . . .	.15	3.78	.0006	.0049	.0004	.34	1.1
TAUNTON	Assawompsett Pond . . . .	.33	3.78	.0028	.0120	.0017	.44	0.8
	Elder's Pond . . . .	.11	4.03	.0019	.0110	.0016	.43	0.9
Wakefield	Crystal Lake . . . .	.18	5.76	.0079	.0150	.0020	.73	2.2
Wareham (Onset)	Jonathan Pond . . . .	.01	2.69	.0014	.0073	.0016	.60	0.4
Wayland	Snake Brook Reservoir . . . .	.74	4.85	.0051	.0191	.0041	.31	1.7
WESTFIELD	Montgomery Reservoir . . . .	.50	3.18	.0034	.0134	.0025	.13	0.7
	Tillotston Brook Reservoir . . . .	.07	3.91	.0041	.0050	.0005	.14	1.0
West Springfield	Bear Hole Brook . . . .	.08	7.67	.0041	.0052	.0009	.19	4.6
	Bear Hole Brook, filtered . . . .	.04	8.30	.0027	.0034	—	.20	4.6
Weymouth	Great Pond . . . .	.77	4.29	.0027	.0204	.0040	.39	1.3
Williamsburg	Reservoir . . . .	.11	4.62	.0005	.0066	.0009	.15	2.3
Winchester	North Reservoir . . . .	.04	4.42	.0022	.0117	.0028	.36	1.9
	South Reservoir . . . .	.04	3.93	.0026	.0112	.0021	.35	1.6
	Middle Reservoir . . . .	.12	3.55	.0063	.0166	.0038	.33	1.8
WORCESTER	Bottomly Reservoir . . . .	.40	4.37	.0044	.0174	.0031	.19	1.6
	Kent Reservoir . . . .	.26	3.82	.0062	.0132	.0017	.18	1.4
	Leicester Reservoir . . . .	.16	2.95	.0032	.0086	.0016	.19	1.4
	Mann Reservoir . . . .	.20	3.20	.0014	.0108	.0002	.12	1.8
	Upper Holden Reservoir . . . .	.15	3.68	.0024	.0082	.0010	.17	0.9
	Lower Holden Reservoir . . . .	.09	3.07	.0025	.0082	.0010	.16	1.3
	Kendall Reservoir . . . .	.15	4.53	.0023	.0119	.0031	.18	1.0

Averages of Chemical Analyses of Ground-water Sources for the Year 1922.

[Parts in 100,000.]

CITY OR TOWN.	Source.	Color.	Residue on Evaporation.	AMMONIA.		Chlorine.	NITROGEN AS —		Hardness.	Iron.
				Free.	Albuminoid.		Nitrates.	Nitrites.		
Acton (West and South Water Supply District)	Tubular wells . . . . .	.00	8.83	.0005	.0011	.51	.0595	.0001	3.5	.016
Adams (Fire District)	Tubular wells . . . . .	.00	13.80	.0000	.0008	.17	.0330	.0000	13.6	.009
Amesbury	Tubular wells . . . . .	.52	14.65	.0063	.0039	.45	.0079	.0001	7.0	.300
Ashland	Tubular wells, old supply . . . . .	.01	5.50	.0003	.0016	.59	.0047	.0000	1.9	.022
	Tubular wells, new supply . . . . .	.01	5.61	.0002	.0017	.44	.0061	.0000	2.3	.018
ATTLEBORO	Wells . . . . .	.00	5.53	.0007	.0032	.50	.0090	.0000	2.1	.006
Auburn	Tubular wells . . . . .	.00	8.27	.0001	.0011	.60	.1367	.0000	3.4	.010
Avon	Wells . . . . .	.00	6.72	.0004	.0019	.47	.0835	.0000	2.5	.010
Ayer	Large well . . . . .	.00	7.50	.0005	.0016	.45	.0490	.0000	2.9	.027
	Tubular wells . . . . .	.00	6.40	.0011	.0015	.32	.0083	.0001	2.9	.024
Barnstable	Tubular wells . . . . .	.00	3.85	.0007	.0011	1.09	.0025	.0000	0.8	.012
Bedford	Large well . . . . .	.01	4.54	.0003	.0016	.32	.0032	.0000	1.7	.028
BillERICA	Old wells . . . . .	.18	12.57	.0006	.0031	.55	.0124	.0002	2.8	.693
	New wells . . . . .	.02	14.97	.0029	.0043	.33	.0045	.0000	7.1	.124
Braintree	Filter-gallery . . . . .	.47	5.00	.0042	.0159	.52	.0060	.0000	1.6	.021
Bridgewater	Wells . . . . .	.00	5.50	.0001	.0012	.58	.0173	.0000	1.7	.022
Brookline	Tubular wells and filter-gallery, filtered . . . . .	.05	10.03	.0007	.0047	.72	.0266	.0000	4.5	.010
Canton	Springdale well . . . . .	.06	5.27	.0005	.0024	.44	.0160	.0000	2.0	.026
	Well near Henry's Spring . . . . .	.07	5.17	.0005	.0023	.44	.0227	.0000	1.8	.014
Chelmsford (North Chelmsford Fire District)	Tubular wells . . . . .	.10	4.98	.0107	.0066	.49	.0367	.0002	2.1	.019
Chelmsford (Water District)	Tubular wells . . . . .	.00	8.02	.0005	.0012	.64	.0985	.0010	3.3	.015
CHICOPPEE (Fairview)	Tubular wells . . . . .	.01	5.73	.0009	.0016	.28	.0599	.0001	2.0	.044
Cohasset	Tubular wells . . . . .	.07	14.36	.0002	.0051	1.85	.1158	.0000	5.2	.012
	Dug well, filtered . . . . .	.02	9.53	.0056	.0057	1.17	.0043	.0001	3.2	.016
Dedham	Large well and tubular wells . . . . .	.08	10.66	.0019	.0044	1.01	.1070	.0001	4.3	.025
Deerfield (Fire District)	Wells . . . . .	.00	6.30	.0000	.0010	.14	.0040	.0000	3.1	.002
Douglas	Tubular wells . . . . .	.00	6.30	.0012	.0024	.43	.0475	.0000	1.9	.039
Draught (Water Supply District)	Tubular wells . . . . .	.00	10.27	.0012	.0024	.70	.1087	.0002	5.0	.017
Draught (Collinsville)	Tubular wells . . . . .	.07	4.92	.0006	.0038	.29	.0090	.0000	2.0	.018
Dudley	Tubular wells . . . . .	.00	4.23	.0003	.0016	.26	.0073	.0000	1.6	.029
Duxbury (Fire and Water District)	Tubular wells . . . . .	.00	3.73	.0001	.0009	.78	.0070	.0000	0.6	.010
East Brookfield	Tubular wells . . . . .	.00	3.80	.0003	.0012	.21	.0070	.0000	1.3	.008
Easthampton	Tubular wells . . . . .	.00	6.80	.0003	.0007	.19	.0177	.0000	3.8	.007
Easton (North Easton Village District)	Well . . . . .	.00	5.54	.0004	.0023	.53	.0581	.0000	1.9	.009
Edgartown	Large well . . . . .	.00	3.30	.0001	.0007	.93	.0013	.0000	0.3	.008
Fairhaven	Tubular wells . . . . .	.37	8.55	.0011	.0058	1.12	.0785	.0000	2.7	.018
Foxborough (Water Supply District)	Tubular wells . . . . .	.00	5.00	.0003	.0010	.47	.0430	.0000	2.0	.010
Framingham	Filter-gallery . . . . .	.00	13.03	.0071	.0042	2.03	.0173	.0007	5.8	.012
Franklin	Tubular wells . . . . .	.00	4.50	.0003	.0013	.53	.0273	.0000	1.9	.005
Grafton	Filter-gallery . . . . .	.04	12.58	.0005	.0031	1.32	.1147	.0000	4.7	.013
Granville	Well . . . . .	.00	4.20	.0006	.001	.16	.0040	.0001	1.6	.008
Greenfield	Well near Green River . . . . .	.00	6.20	.0013	.0032	.11	.0040	.0001	4.2	.013
Groton	Large well . . . . .	.00	5.07	.0003	.0015	.22	.0033	.0000	2.9	.008
Groton (West Groton Water Supply District)	Tubular wells . . . . .	.00	4.98	.0007	.0012	.16	.0080	.0001	2.9	.007
Hingham	Wells . . . . .	.15	5.23	.0014	.0056	.61	.0104	.0000	1.6	.020
Holliston	Large well . . . . .	.37	4.59	.0027	.0117	.31	.0055	.0000	1.7	.023
Hopkinton	Tubular wells . . . . .	.00	12.70	.0006	.0012	.90	.2300	.0001	4.7	.017
Kingston	Tubular wells . . . . .	.00	4.37	.0001	.0008	.71	.0140	.0000	1.3	.007
Leicester (Water Supply District)	Wells . . . . .	.15	6.20	.0006	.0016	.20	.0280	.0000	2.0	.040
Leicester (Cherry Valley and Rochdale Water District)	Wells . . . . .	.23	5.57	.0027	.0147	.30	.0040	.0000	2.1	.016
Littleton	Tubular wells . . . . .	.00	4.03	.0002	.0011	.18	.0087	.0000	1.9	.008
LOWELL	Boulevard wells (tubular) . . . . .	.48	6.77	.0345	.0050	.39	.0216	.0002	2.5	.329
	Boulevard wells, filtered . . . . .	.01	5.89	.0011	.0028	.42	.0273	.0001	2.3	.017
Manchester	Wells . . . . .	.00	11.73	.0004	.0011	1.89	.1255	.0000	3.9	.016
Mansfield (Water Supply District)	Large well . . . . .	.00	4.40	.0003	.0014	.31	.0682	.0000	1.8	.010

Averages of Chemical Analyses of Ground-water Sources, etc. — Concluded.

[Parts in 100,000.]

CITY OR TOWN.	Source.	Color.	Residue on Evaporation.	AMMONIA.		Chlorine.	NITROGEN AS —		Hardness.	Iron.
				Free.	Albuminoid.		Nitrates.	Nitrites.		
Marblehead	Inlet of filter . . . .	.16	14.12	.0093	.0064	1.49	.0077	.0001	5.5	.134
	Outlet of filter . . . .	.10	14.58	.0007	.0052	1.76	.0083	.0000	6.3	.012
	Well . . . .	.04	17.27	.0005	.0031	2.62	.0123	.0001	7.4	.009
Marion	Tubular wells . . . .	.00	4.60	.0004	.0016	.65	.0176	.0000	1.5	.009
Marshfield	Tubular wells at Huma- rock Beach . . . .	.00	8.55	.0024	.0013	1.82	.0290	.0002	2.4	.115
Mattapoisett	Tubular wells . . . .	.00	6.85	.0015	.0027	.90	.0500	.0000	2.4	.008
Medfield	Spring . . . .	.18	5.33	.0010	.0047	.23	.0047	.0000	1.6	.011
Medway	Wells . . . .	.00	6.52	.0014	.0027	.62	.0360	.0000	2.6	.019
Merrimac	Tubular wells . . . .	.00	8.04	.0009	.0014	.53	.0174	.0000	3.5	.013
Methuen	Tubular wells . . . .	.36	8.25	.0039	.0082	.47	.0234	.0000	3.1	.081
Middleborough (Fire District)	Well . . . .	.31	7.43	.0083	.0068	.58	.0295	.0002	2.5	.310
	Filtered water . . . .	.06	5.97	.0003	.0026	.58	.0308	.0000	2.5	.027
Millbury	Well . . . .	.00	5.17	.0005	.0019	.28	.0255	.0000	2.0	.006
Millis	Spring . . . .	.00	12.08	.0005	.0012	.85	.1517	.0001	5.2	.007
Monson	Large well . . . .	.05	3.85	.0002	.0024	.20	.0032	.0000	1.2	.010
Nantucket	Wells in Wyers Valley . . . .	.00	4.85	.0000	.0016	1.51	.0070	.0000	1.2	.011
Natick	Large well . . . .	.00	10.15	.0003	.0012	.88	.0410	.0000	4.9	.010
Needham	Wells . . . .	.00	7.32	.0004	.0024	.69	.0663	.0001	2.9	.012
	Hicks Spring . . . .	.01	9.03	.0003	.0016	.81	.1810	.0000	2.9	.010
NEWBURYPORT	Wells and Artichoke River, filtered . . . .	.13	6.86	.0007	.0070	.64	.0219	.0000	2.9	.034
NEWTON	Tubular wells and filter- gallery . . . .	.00	5.58	.0005	.0026	.40	.0248	.0000	2.4	.012
North Attleborough	Wells . . . .	.00	6.11	.0006	.0018	.48	.0231	.0000	2.4	.013
Northbridge	Tubular wells . . . .	.01	2.97	.0005	.0031	.26	.0050	.0000	1.2	.010
Norton	Tubular wells . . . .	.00	4.70	.0002	.0009	.37	.0037	.0000	1.4	.009
Norwood	Tubular wells . . . .	.13	6.92	.0015	.0031	.49	.0217	.0001	3.0	.061
Oak Bluffs	Springs . . . .	.00	4.33	.0005	.0010	.89	.0090	.0000	1.0	.020
Oxford	Tubular wells . . . .	.00	4.70	.0003	.0010	.43	.0600	.0000	1.8	.007
Palmer (Bondsville)	Tubular wells . . . .	.00	6.38	.0003	.0017	.26	.0160	.0001	2.2	.018
Pepperell	Tubular wells . . . .	.00	3.60	.0004	.0014	.18	.0045	.0000	0.9	.009
Provincetown	Tubular wells . . . .	.01	39.80	.0003	.0011	16.95	.0051	.0000	9.7	.024
Reading	Filter-gallery . . . .	.61	9.73	.0155	.0170	.95	.0145	.0000	2.5	.280
	Filtered water . . . .	.37	14.64	.0017	.0081	.78	.0098	.0002	9.0	.102
Salisbury	Well . . . .	.14	8.47	.0012	.0026	.60	.0042	.0000	4.0	.042
Scituate	Tubular wells . . . .	.00	15.55	.0004	.0015	2.76	.1467	.0000	5.9	.015
Sharon	Well . . . .	.00	17.25	.0005	.0011	2.82	.2500	.0000	7.5	.009
	Tubular wells . . . .	.00	5.37	.0001	.0014	.55	.0477	.0000	2.5	.007
Sheffield	Spring . . . .	.00	3.90	.0000	.0006	.14	.0020	.0000	2.0	.010
Shirley (Shirley Village Water District)	Well . . . .	.00	4.92	.0003	.0010	.45	.0912	.0000	1.3	.007
Shrewsbury	Tubular wells . . . .	.00	5.35	.0002	.0015	.45	.0440	.0000	2.0	.006
South Hadley (Fire Dis- trict No. 2)	Large well . . . .	.00	4.47	.0009	.0017	.20	.0413	.0000	1.5	.009
Tisbury	Well . . . .	.00	4.37	.0005	.0011	.98	.0030	.0001	0.9	.008
Uxbridge	Tubular wells . . . .	.00	5.77	.0004	.0011	.50	.0567	.0000	1.7	.008
Walpole	Tubular wells . . . .	.00	5.15	.0004	.0015	.36	.0353	.0000	2.2	.019
WALTHAM	Old well . . . .	.08	9.30	.0041	.0034	.63	.0157	.0000	4.1	.049
	New well . . . .	.00	7.25	.0003	.0031	.49	.0168	.0000	3.2	.009
Ware	Wells . . . .	.00	8.03	.0004	.0013	.60	.1127	.0000	3.0	.014
Wareham (Fire District)	Tubular wells . . . .	.00	3.57	.0008	.0011	.56	.0027	.0000	0.8	.009
Webster	Wells . . . .	.00	4.25	.0007	.0019	.36	.0115	.0000	1.9	.015
Wellesley	Tubular wells . . . .	.00	9.54	.0007	.0018	1.09	.0625	.0000	4.3	.021
	Well at Williams Spring . . . .	.00	—	.0000	.0010	1.09	.3800	.0000	5.3	.005
	Filter-gallery . . . .	.00	8.90	.0003	.0024	.92	.0790	.0000	4.3	.013
Westborough	Filter basin . . . .	.01	3.36	.0010	.0082	.27	—	—	1.4	.012
West Brookfield	Tubular wells . . . .	.00	5.67	.0001	.0008	.31	.0667	.0000	1.8	.006
Westford	Tubular wells . . . .	.00	4.40	.0002	.0012	.21	.0105	.0000	2.2	.009
Weston	Well at Warren Ave. . . .	.13	7.43	.0007	.0045	.45	.0205	.0000	3.2	.010
	Tubular wells at Kendal Green . . . .	.00	7.28	.0004	.0020	.55	.0767	.0000	2.3	.010
Williamstown	Springs . . . .	.02	7.96	.0003	.0023	.11	.0037	.0000	6.6	.012
Winchendon	Old wells . . . .	.21	3.87	.0015	.0023	.13	.0070	.0000	1.4	.125
	New wells . . . .	.21	3.25	.0009	.0038	.13	.0042	.0000	1.3	.008
WOBURN	Filter-gallery . . . .	.00	11.67	.0011	.0037	1.30	.0478	.0001	5.9	.007
Worthington (Fire Dis- trict)	Springs . . . .	.00	3.70	.0002	.0006	.13	.0150	.0000	1.1	.008
Wrentham	Tubular wells . . . .	.00	3.17	.0009	.0015	.29	.0083	.0000	1.6	.012

WATER SUPPLY STATISTICS.

During the year ending November 30, 1922, no new water supplies were introduced in the cities and towns of Massachusetts and very few extensions were made to existing supplies.

CONSUMPTION OF WATER.

Records of the consumption of water are kept in nearly all cities and towns where the water is pumped, while in some of the places supplied by gravity Venturi meters have been installed to measure the quantity used. The consumption of water in the various cities and towns from which records could be obtained for the year 1922 is presented in the following table. An estimate of the population of each municipality or district is also included, this estimate having been made by adding two-fifths of the increase in population between 1915 and 1920 to the population as determined by the census of the latter year. In cases where the population decreased from 1915 to 1920 the population during the year 1922 is estimated to be the same as that of the year 1920.

The average daily consumption per person, as given in the table, has been obtained by dividing the average daily quantity of water used by the estimated total population of the city or town. The per capita consumption estimated in this way is somewhat less than the actual consumption per person using the water in most cases, because there is in all places a greater or less number of persons who do not use the public water supply. This fact accounts to a large extent for the low rate of consumption in some of the towns which contain populous districts to which the public water supply has not been extended. There are other cases where the consumption of water per person is greatly increased by the use of large quantities of water for industrial purposes, and there are others in which a large summer population not enumerated in the census increases materially the average consumption of water per person as given in the table.

The consumption of water in the year 1922 was, on the whole, somewhat higher than during the previous year, but the comparatively warm winter and the excessive rainfall of the summer season, combined with a continued business depression during the greater part of the year, has made the water supply requirements less in most places than under normal conditions.

The records of consumption are shown in the following table:

Consumption of Water in Various Cities and Towns in 1922.

CITY OR TOWN.	Esti- mated Popu- lation.	AVERAGE DAILY CONSUMPTION.		CITY OR TOWN.	Esti- mated Popu- lation.	AVERAGE DAILY CONSUMPTION.	
		Gallons.	Gallons per Inhabit- ant.			Gallons.	Gallons per Inhabit- ant.
Metropolitan District: ¹				Metropolitan District— <i>Con.</i>			
Arlington . . .	1,226,440	119,267,100	97	QUINCY . . .	50,757	4,253,700	84
Belmont . . .	20,176	1,059,600	53	REVERE . . .	30,281	2,202,200	73
Boston . . .	11,816	673,200	57	SOMERVILLE . . .	95,586	7,357,300	77
CHELSEA . . .	749,109	85,871,000	115	Stoneham . . .	8,026	523,200	65
EVERETT . . .	43,184	3,416,500	79	Swampscott . . .	8,404	629,800	75
Lexington . . .	41,081	3,648,900	89	Watertown . . .	23,434	1,621,800	69
MALDEN . . .	6,675	440,000	66	Winthrop . . .	16,534	902,400	55
MEDFORD . . .	49,182	2,698,000	55	Acton . . .	2,166	140,000	65
MELROSE . . .	42,449	2,193,400	52	Acushnet . . .	3,350	37,000	11
Milton . . .	18,733	1,167,800	62	Agawam . . .	5,210	159,000	31
Nahant . . .	9,695	436,000	45	Amesbury . . .	10,633	542,000	51
	1,318	172,300	131				

¹ Figures for metropolitan consumption are exclusive of Newton and are based entirely on meter readings. District result, based on pumpage, will vary slightly from the above.

Consumption of Water in Various Cities and Towns in 1922 — Concluded.

CITY OR TOWN.	Estimated Population.	AVERAGE DAILY CONSUMPTION.		CITY OR TOWN.	Estimated Population.	AVERAGE DAILY CONSUMPTION.	
		Gallons.	Gallons per Inhabit- ant.			Gallons.	Gallons per Inhabit- ant.
Amherst	5,550	740,000	133	Medway	3,000	156,000	52
Andover	8,384	718,000	86	Merrimac	2,202	118,000	54
Ashburnham	2,012	77,000	38	Methuen	15,662	831,000	53
Ashland	2,400	280,000	117	Middleborough	8,453	399,000	47
Athol	9,796	1,193,000	122	Millford and Hopedale	16,248	868,000	53
ATTLEBORO	20,231	1,062,000	52	Millbury	5,796	365,000	63
Avon	2,181	101,000	46	Millis	1,502	60,000	40
Ayer	3,161	248,000	78	Moutague and Erving	8,970	677,000	75
Barnstable	4,836	190,000	39	Nantucket ¹	2,797	289,000	103
Bedford	1,362	42,000	31	Natick	10,907	636,000	58
BEVERLY	22,561	1,402,000	62	Needham	7,200	466,000	65
Billerica	3,806	294,000	77	NEW BEDFORD	125,876	10,691,000	85
Braintree	11,075	971,000	88	NEWBURYPORT	15,741	1,348,000	86
BROCKTON	67,841	3,025,000	45	NEWTON	47,231	3,888,000	82
Brookline	39,451	3,585,000	91	North Andover	6,388	418,000	65
CAMBRIDGE	110,043	11,244,000	102	North Attleborough	9,238	525,000	57
Chelmsford	5,882	139,000	24	Northbridge	10,542	777,000	74
Clinton	12,979	1,056,000	81	North Brookfield	2,610	361,000	138
Concord	6,461	639,000	99	Norton	2,374	150,000	63
Danvers and Middle- ton	12,303	1,493,000	121	Norwood	13,287	1,173,000	88
Dartmouth	6,958	64,000	9	Oak Bluffs	1,047	194,000	185
Dedham	10,792	794,000	74	Orange	5,398	125,000	23
Dracut	5,783	115,000	20	PEABODY	19,923	3,781,000	190
Dudley	3,701	150,000	41	Pepperell	2,468	148,000	60
Duxbury	1,553	98,000	63	PITTSFIELD	42,626	5,929,000	139
Easthampton	11,828	822,000	69	Plainville	1,365	60,000	44
East Longmeadow	2,517	33,000	13	Plymouth	13,092	1,281,000	98
Easton	5,041	228,000	45	Provincetown	4,246	320,000	75
Edgartown	1,190	90,000	76	Randolph and Hol- brook	8,011	524,000	65
Fairhaven	7,696	508,000	66	Reading	7,692	264,000	34
FALL RIVER	120,485	6,361,000	53	Rockport	3,878	308,000	79
Falmouth	3,500	439,000	125	SALEM	44,660	5,181,000	116
FITCHBURG	41,578	4,429,000	107	Salisbury	1,701	135,000	79
Framingham	17,502	1,156,000	66	Saugus	11,133	602,000	54
Franklin	6,520	396,000	61	Scituate	2,534	376,000	148
Gardner	17,209	766,000	45	Sharon	2,467	203,000	82
GLOUCESTER	22,947	1,597,000	70	Shirley	2,264	95,000	42
Grafton	7,142	123,000	17	Shrewsbury	4,073	146,000	36
Greenfield	16,599	1,484,000	89	Southbridge	14,256	813,000	57
Groton	2,185	161,000	74	SPRINGFIELD	140,271	12,213,000	87
Groveland	2,759	46,000	17	Stockbridge	1,764	189,000	107
Haverhill	55,657	5,554,000	100	Stoughton	6,865	455,000	66
Holliston	2,707	112,000	41	TAUNTON	37,528	3,221,000	86
HOLYOKE	60,203	6,948,000	115	Tisbury	1,275	175,000	137
Ipswich	6,201	411,000	66	Uxbridge	5,569	488,000	88
Lancaster	2,461	87,000	35	Wakefield	13,122	686,000	52
LAWRENCE	95,874	4,574,000	48	Walpole	5,446	842,000	155
Lenox	2,691	247,000	92	WALTHAM	31,220	2,129,000	68
Lincoln	1,042	211,000	202	Wareham	4,415	164,000	37
Littleton	1,296	36,000	28	Webster	13,535	716,000	53
LOWELL	114,672	6,328,000	55	Wellesley	6,224	600,000	96
Ludlow	7,957	200,000	25	West Brookfield	1,281	41,000	32
LYNN	100,486	7,531,000	75	WESTFIELD	18,681	2,496,000	134
Manchester	2,466	272,000	110	Westford	3,301	128,000	39
Mansfield	6,448	416,000	65	Weston	2,282	119,000	52
Marblehead	7,324	580,000	79	Weymouth	15,492	1,026,000	66
Marion	1,288	113,000	88	Whitman	7,147	276,000	39
MARLBOROUGH	15,028	622,000	41	WOBURN	16,639	2,093,000	126
Mattapoisett	1,277	75,000	59	WORCESTER	186,577	15,756,000	84
Maynard	7,213	306,000	42	Wrentham	2,965	78,000	26

¹ Does not include supply at Siasconset.

RAINFALL.

The rainfall for the year 1922 was in excess of the normal as shown by records of long continued observations in various parts of the State. There was an excess in the months of March, May, June, July and August, the rainfall for the month of June alone amounting in some places to nearly half the entire rainfall for the twelve months in a dry year. The rainfall for that month was more than 5 inches in excess of the normal in the State as a whole and was the highest ever recorded in June in the neighborhood of Boston for more than 100 years. The greatest deficiency in rainfall occurred in the month of November, in which the total precipitation was 1.33 inches, or 2.55 inches less than the normal. Considerable deficiencies occurred also in the months of January and April. The excessive rainfall, especially in the summer months, has maintained water supply reservoirs at a higher level throughout the year in most cases than has been the case for many years.

MONTH.	Normal Rainfall (Inches).	Rainfall in 1922 (Inches).	Excess or Defi- ciency in 1922 (Inches).	MONTH.	Normal Rainfall (Inches).	Rainfall in 1922 (Inches).	Excess or Defi- ciency in 1922 (Inches).
January . . .	3.75	1.99	-1.76	August . . .	4.19	5.93	+1.74
February . . .	3.68	3.07	-0.61	September . . .	3.46	3.38	-0.08
March . . .	3.99	5.17	+1.18	October . . .	3.67	2.90	-0.77
April . . .	3.66	2.14	-1.52	November . . .	3.88	1.33	-2.55
May . . .	3.65	5.08	+1.43	December . . .	3.69	3.35	-0.34
June . . .	3.31	8.31	+5.00				
July . . .	3.75	4.93	+1.18	Totals . . .	44.68	47.58	+2.90

FLOW OF STREAMS.

Sudbury River.

The average yield of the Sudbury River during the year 1922 was 980,000 gallons per day per square mile of drainage area, or about the same as the normal yield for the past forty-eight years. The yield was above the normal in the months of May, June, July, August and September, but less than the normal in the other seven months of the year. The greatest excess occurred in the month of June and the greatest deficiency in the month of January. The average yield for the driest six months, July to December inclusive, was 463,000 gallons per day per square mile, or about 21 per cent above the normal yield for the driest six months during the past forty-eight years.

In order to show the relation between the yield of the Sudbury River during each month of the year 1922 and the normal yield of that stream, as deduced from observations during forty-eight years, from 1875 to 1922, inclusive, the following table has been prepared. The drainage area of the Sudbury River above the point of measurement is 75.2 square miles.

Table showing the Average Daily Yield of the Sudbury River for Each Month in the Year 1922, in Cubic Feet per Second per Square Mile of Drainage Area, and in Million Gallons per Day per Square Mile of Drainage Area; also, Departure from the Normal.

MONTH.	NORMAL YIELD.		ACTUAL YIELD IN 1922.		EXCESS OR DEFICIENCY.	
	Cubic Feet per Second per Square Mile.	Million Gallons per Day per Square Mile.	Cubic Feet per Second per Square Mile.	Million Gallons per Day per Square Mile.	Cubic Feet per Second per Square Mile.	Million Gallons per Day per Square Mile.
January	1.730	1.118	.500	.323	-1.230	-.795
February	2.458	1.589	1.264	.817	-1.194	-.772
March	4.224	2.730	3.979	2.571	-.245	-.159
April	3.050	1.972	3.026	1.956	-.024	-.016
May	1.720	1.111	2.712	1.753	+.992	+.642
June . . . . .	.810	.523	2.415	1.561	+1.605	+1.038
July . . . . .	.328	.212	1.117	.722	+.789	+.510
August . . . . .	.350	.226	.544	.351	+.194	+.125
September . . . . .	.360	.232	1.016	.657	+.656	+.425
October . . . . .	.596	.385	.422	.272	-.174	-.113
November	1.120	.724	.573	.370	-.547	-.354
December	1.452	.939	.633	.409	-.819	-.530
Average for whole year	1.511	.977	1.516	.980	+.005	+.003

The following table gives the rainfall upon the Sudbury River watershed and the total yield expressed in inches in depth upon the watershed (inches of rainfall collected) for each of the past six years, from 1917 to 1922, inclusive, together with the average for a period of forty-eight years, from 1875 to 1922:—

Rainfall, in Inches, received and collected on the Sudbury River Drainage Area.

MONTH.	1917.			1918.			1919.			1920.		
	Rain-fall.	Rain-fall collected.	Per Cent collected.	Rain-fall.	Rain-fall collected.	Per Cent collected.	Rain-fall.	Rain-fall collected.	Per Cent collected.	Rain-fall.	Rain-fall collected.	Per Cent collected.
January	3.50	.909	25.9	3.47	.486	14.0	3.52	2.329	66.1	3.26	.556	17.1
February	2.68	1.216	45.5	3.58	2.914	81.3	3.40	1.477	43.4	6.49	1.239	19.1
March	4.96	3.940	79.4	2.50	3.896	156.2	4.79	4.916	102.7	4.45	9.262	207.9
April	2.41	2.425	100.5	4.43	2.530	57.1	2.93	2.957	101.0	5.19	5.017	96.6
May	4.93	2.632	53.4	1.16	1.141	98.8	4.60	2.301	50.0	3.45	3.292	95.6
June	4.23	1.802	42.7	3.65	.319	8.7	1.86	.193	10.4	6.67	2.929	43.9
July	1.11	.076	6.8	4.07	.171	4.2	5.47	.533	9.8	2.04	.506	24.9
August	6.40	.361	5.6	1.61	-.096	-6.0	3.75	.164	4.4	1.78	-.070	-4.0
September	1.52	.100	6.6	8.60	1.100	12.8	5.28	1.232	23.3	3.53	.110	3.1
October	5.65	.860	15.2	1.04	.490	47.0	2.16	.498	23.1	1.01	-.046	-4.6
November	1.31	.757	57.6	2.75	.843	30.7	5.90	2.202	37.3	5.68	1.154	20.3
December	2.81	.678	24.2	3.68	1.673	45.5	1.98	1.952	98.6	5.11	2.141	41.9
Totals and averages	41.51	15.756	38.0	40.54	15.467	38.2	45.64	20.754	45.5	48.66	26.090	53.6

Rainfall, in Inches, received and collected on the Sudbury River Drainage Area—
Concluded.

MONTH.	1921.			1922.			MEAN FOR FORTY-EIGHT YEARS, 1875-1922.		
	Rain- fall.	Rain- fall col- lected.	Per Cent col- lected.	Rain- fall.	Rain- fall col- lected.	Per Cent col- lected.	Rain- fall.	Rain- fall col- lected.	Per Cent col- lected.
January	2.78	1.742	62.7	1.89	.577	30.5	3.95	1.994	50.5
February	4.10	1.361	33.2	3.25	1.316	40.5	4.13	2.581	62.5
March	2.72	4.050	148.8	5.35	4.587	85.7	4.32	4.870	112.7
April	5.30	1.973	37.2	1.63	3.371	207.1	3.57	3.403	95.2
May	3.23	2.957	91.6	5.39	3.126	58.0	3.45	1.983	59.2
June	3.82	.295	7.7	8.90	2.695	30.3	3.29	.904	27.5
July	6.86	1.822	26.6	3.21	1.287	40.1	3.70	.379	10.2
August	1.20	.105	8.7	4.85	.627	12.9	3.78	.403	10.6
September	1.88	— .099	— 5.3	4.09	1.135	27.7	3.40	.401	11.8
October	1.12	— .175	— 15.6	2.28	.486	21.3	3.59	.687	19.1
November	7.95	1.152	14.5	1.34	.639	47.8	3.78	1.250	33.1
December	2.54	1.367	53.8	3.42	.730	21.4	3.76	1.674	44.6
Totals and averages	43.50	16.550	38.0	45.60	20.576	45.1	44.62	20.529	46.0

The following table gives the record of the yield of the Sudbury River watershed for each of the past six years and the mean for forty-eight years, the yield being expressed in gallons per day per square mile of watershed:—

Yield of the Sudbury River Drainage Area in Gallons per Day per Square Mile.¹

MONTH.	1917.	1918.	1919.	1920.	1921.	1922.	Mean for Forty-eight Years, 1875-1922.
January	510,000	273,000	1,306,000	312,000	976,000	323,000	1,118,000
February	755,000	1,809,000	917,000	743,000	845,000	817,000	1,589,000
March	2,209,000	2,187,000	2,759,000	5,192,000	2,270,000	2,571,000	2,730,000
April	1,405,000	1,466,000	1,713,000	2,911,000	1,144,000	1,956,000	1,972,000
May	1,476,000	639,000	1,290,000	1,846,000	1,658,000	1,753,000	1,111,000
June	1,044,000	185,000	112,000	1,696,000	171,000	1,561,000	523,000
July	43,000	96,000	299,000	284,000	1,021,000	722,000	212,000
August	202,000	— 54,000	92,000	— 39,000	59,000	351,000	226,000
September	58,000	637,000	713,000	64,000	— 58,000	657,000	232,000
October	482,000	274,000	279,000	— 26,000	— 98,000	272,000	385,000
November	438,000	489,000	1,275,000	669,000	667,000	370,000	724,000
December	380,000	938,000	1,095,000	1,200,000	766,000	409,000	939,000
Average for whole year	750,000	736,000	988,000	1,239,000	788,000	980,000	977,000
Average for driest six months	267,000	269,000	458,000	360,000	294,000	463,000	382,000

¹ The drainage area of the Sudbury River used in making up these records included water surfaces amounting to about 2 per cent of the whole area from 1875 to 1878, inclusive, subsequently increasing by the construction of storage reservoirs to about 3 per cent in 1879, to 3.5 per cent in 1885, to 4 per cent in 1894, and to 6.5 per cent in 1898. The drainage area also contains extensive areas of swampy land, which, though covered with water at times, are not included in the above percentages of water surfaces.

Nashua River.

The average yield of the South Branch of the Nashua River at the outlet of the Wachusett Reservoir, Clinton, during the year 1922 was 1,321,000 gallons per day per square mile, or 21 per cent in excess of the normal for the past twenty-six years. The yield in the months of March, April, May, June, July, August and September was in excess of the normal. The greatest excess occurred in June

and the greatest deficiency in December. Deficiencies also occurred in the months of January, February, October and November.

In order to show the relation between the yield of the Nashua River during each month of the year 1922 and the normal yield of that stream as deduced from observations during twenty-six years, 1897 to 1922, inclusive, the following table has been prepared. The drainage area of the Nashua River above the point of measurement was 119 square miles from 1897 to 1907, and 118.19 square miles from 1908 to 1913, inclusive. Since Jan. 1, 1914, the city of Worcester has been diverting water from 9.35 square miles of this drainage area for the supply of that city, leaving the net drainage area 108.84 square miles. In the calculations of yield, allowance has been made for water overflowing from the Worcester area.

Table showing the Average Daily Yield of the South Branch of the Nashua River for Each Month in the Year 1922, in Cubic Feet per Second per Square Mile of Drainage Area, and in Million Gallons per Day per Square Mile of Drainage Area; also, Departure from the Normal.

MONTH.	NORMAL YIELD.		ACTUAL YIELD IN 1922.		EXCESS OR DEFICIENCY.	
	Cubic Feet per Second per Square Mile.	Million Gallons per Day per Square Mile.	Cubic Feet per Second per Square Mile.	Million Gallons per Day per Square Mile.	Cubic Feet per Second per Square Mile.	Million Gallons per Day per Square Mile.
January	1.779	1.150	.918	.593	-.861	-.557
February	2.066	1.336	1.560	1.008	-.506	-.328
March	4.152	2.684	5.170	3.341	+1.018	+.657
April	3.334	2.155	3.687	2.383	+ .353	+.228
May	2.038	1.318	3.046	1.968	+1.008	+.650
June	1.320	0.853	3.440	2.223	+2.120	+1.370
July	0.783	0.506	2.318	1.498	+1.535	+.992
August	0.642	0.415	1.231	.795	+ .589	+.380
September	0.565	0.365	.798	.516	+ .233	+.151
October	0.720	0.466	.671	.434	-.049	-.032
November	1.189	0.768	.817	.528	-.372	-.240
December	1.784	1.154	.856	.553	-.928	-.601
Average for whole year	1.696	1.096	2.045	1.321	+ .349	+.225

The following table gives the rainfall upon the Nashua River watershed and the total yield expressed in inches in depth upon the watershed (inches of rainfall collected) for each of the past six years, from 1917 to 1922, inclusive, together with the average for the past twenty-six years:—

Rainfall, in Inches, received and collected on the Nashua River Drainage Area.

MONTH.	1917.			1918.			1919.			1920.		
	Rain-fall.	Rain-fall collected.	Per Cent collected.	Rain-fall.	Rain-fall collected.	Per Cent collected.	Rain-fall.	Rain-fall collected.	Per Cent collected.	Rain-fall.	Rain-fall collected.	Per Cent collected.
January	3.37	1.224	36.3	2.97	.864	29.1	3.23	2.392	74.1	3.17	1.153	36.4
February	3.05	1.476	48.3	4.25	3.260	76.6	3.51	1.279	36.5	6.26	1.210	19.3
March	4.21	4.409	104.8	2.24	4.614	206.0	5.27	5.621	106.7	4.26	8.356	196.0
April	1.80	2.535	140.6	3.47	2.775	80.0	2.57	2.954	115.0	6.13	6.031	98.4
May	3.89	2.350	60.5	1.07	1.201	112.8	6.06	3.931	64.9	4.01	3.695	92.1
June	4.47	2.122	47.4	4.57	.902	19.8	2.01	.798	39.6	6.07	3.317	54.6
July	1.22	.471	38.8	2.80	.499	17.8	5.00	.713	14.3	4.33	1.443	33.3
August	4.46	.552	12.4	2.82	.284	10.1	4.17	.467	11.2	2.91	.584	20.1
September	1.20	.144	12.0	7.18	1.041	14.5	6.78	1.887	27.8	6.39	.931	14.6
October	6.03	.990	16.4	1.58	.609	38.6	2.35	.884	37.6	.63	.731	116.1
November	1.25	.540	43.1	3.08	1.004	32.6	6.01	3.168	52.7	5.49	2.246	40.9
December	2.31	.694	30.0	3.74	1.884	50.4	2.09	2.305	110.4	6.01	4.619	76.9
Totals and averages	37.26	17.507	47.0	39.77	18.937	47.6	49.05	26.399	53.8	55.66	34.316	61.7

Rainfall, in Inches, received and collected on the Nashua River Drainage Area—Concluded.

MONTH.	1921.			1922.			MEAN FOR TWENTY-SIX YEARS, 1897-1922.		
	Rain- fall.	Rain- fall col- lected.	Per Cent col- lected.	Rain- fall.	Rain- fall col- lected.	Per Cent col- lected.	Rain- fall.	Rain- fall col- lected.	Per Cent col- lected.
January	2.67	2.521	94.3	2.40	1.058	44.0	3.51	2.051	58.5
February	4.07	1.719	42.2	3.77	1.624	43.0	3.89	2.167	55.6
March	2.87	4.477	156.1	6.21	5.960	96.0	4.13	4.788	116.0
April	6.51	3.329	51.1	2.19	4.108	187.6	3.81	3.721	97.8
May	3.01	3.695	123.0	4.78	3.511	73.5	3.46	2.350	67.9
June	3.75	.828	22.1	9.22	3.838	41.6	3.99	1.473	36.9
July	6.41	1.821	28.4	4.91	2.672	54.5	4.21	.902	21.4
August	1.94	.438	22.6	5.59	1.419	25.4	4.06	.740	18.2
September	2.35	.197	8.4	2.77	.891	32.2	3.74	.631	16.9
October	2.00	.282	14.1	2.41	.774	32.1	3.15	.831	26.4
November	7.31	1.366	18.7	1.59	.912	57.3	3.55	1.326	37.4
December	2.77	2.271	82.1	4.02	.987	24.5	4.01	2.057	51.3
Totals and averages	45.66	22.944	50.3	49.86	27.754	55.7	45.51	23.037	50.6

The following table gives a record of the yield of the Nashua River for each of the past six years and the mean for the past twenty-six years, the yield being expressed in gallons per day per square mile of watershed:—

Yield of the Nashua River Drainage Area in Gallons per Day per Square Mile.¹

MONTH.	1917.	1918.	1919.	1920.	1921.	1922.	Mean for Twenty-six Years, 1897-1922.
January	686,000	484,000	1,341,000	646,000	1,413,000	593,000	1,150,000
February	916,000	2,024,000	794,000	725,000	1,067,000	1,008,000	1,336,000
March	2,472,000	2,590,000	3,155,000	4,685,000	2,510,000	3,341,000	2,684,000
April	1,468,000	1,608,000	1,711,000	3,498,000	1,931,000	2,383,000	2,155,000
May	1,317,000	673,000	2,204,000	2,071,000	2,071,000	1,968,000	1,318,000
June	1,229,000	523,000	462,000	1,922,000	480,000	2,223,000	853,000
July	264,000	280,000	400,000	809,000	1,021,000	1,498,000	506,000
August	309,000	159,000	262,000	327,000	246,000	795,000	415,000
September	84,000	603,000	1,093,000	540,000	114,000	516,000	365,000
October	555,000	341,000	495,000	409,000	158,000	434,000	466,000
November	313,000	582,000	1,835,000	1,301,000	791,000	528,000	768,000
December	389,000	1,056,000	1,292,000	2,590,000	1,273,000	553,000	1,154,000
Average for whole year	834,000	902,000	1,257,000	1,629,000	1,092,000	1,321,000	1,096,000
Average for driest six months	320,000	412,000	752,000	870,000	468,000	723,000	561,000

¹ The drainage area used in making up these records included water surfaces amounting to 2.2 per cent of the whole area from 1897 to 1902, inclusive, to 2.4 per cent in 1903, to 3.6 per cent in 1904, to 4.1 per cent in 1905, to 5.1 per cent in 1906, to 6 per cent in 1907, to 7 per cent in 1908, 1909 and 1910, to 6.5 per cent in 1911, to 6.8 per cent in 1912, to 7 per cent in 1913, to 7.4 per cent in 1914 and 1915, to 7.6 per cent in 1916, to 7.4 per cent in 1917 and 1918, and 7.5 per cent in 1919, 1920, 1921, and 1922.

Merrimack River.

The flow of the Merrimack River has been measured for many years at Lawrence, above which city the river has a total drainage area of 4,663 square miles, which includes 118¹ square miles on the South Branch of the Nashua River, 75 square miles on the Sudbury River, and 18 square miles tributary to Lake Cochituate, or a combined area of 211¹ square miles from which water is drawn at the present time for the supply of the Metropolitan Water District. The flow as measured

¹ Including 9.35 square miles from which water is drawn for the supply of the city of Worcester.

at Lawrence includes the water wasted from these three drainage areas, the aggregate quantity of which, in the wet months of the year, is considerable, but which becomes very small in the dry months. Records of the quantity of water wasted have been kept by the Metropolitan District Commission and its predecessors, and these quantities have been deducted from the flow as measured at Lawrence. In presenting the record of the flow of the river, these three drainage areas have been deducted from the total above Lawrence, so that the net drainage area above that point was 4,567 square miles in 1880, 4,570 square miles in the years 1881 to 1897, inclusive, and 4,452 square miles since the latter year.

The average flow of the Merrimack River during the year 1922 amounted to 1.819 cubic feet per second, or 1,176,000 gallons per day, per square mile of drainage area, or 23 per cent above the normal flow for the past forty-three years for which records are available. The flow was in excess of the normal in the months of March, April, May, June, July, August and September, and less than the normal in the other five months of the year.

In order to show the relation between the flow of this stream during each month of the year 1922 and the normal flow as deduced from observations during forty-three years, from 1880 to 1922, inclusive, the following table has been prepared:—

Table showing the Average Monthly Flow of the Merrimack River at Lawrence for the Year 1922, in Cubic Feet per Second per Square Mile of Drainage Area; also, Departure from the Normal Flow.

MONTH.	Normal Flow, 1880-1922.	Actual Flow in 1922.	Excess or Deficient cy.
January	1.267	.830	— .437
February	1.362	.887	— .475
March	2.795	3.900	+1.105
April	3.473	4.903	+1.430
May	2.228	2.887	+ .659
June	1.291	3.006	+1.715
July . . . . .	.780	2.111	+1.331
August . . . . .	.664	.773	+ .109
September . . . . .	.649	.766	+ .117
October . . . . .	.803	.660	— .143
November	1.103	.612	— .491
December	1.260	.498	— .762
Average for whole year	1.473	1.819	+ .346

The following table gives the record of the flow of the Merrimack River at Lawrence for each of the past six years and the mean for forty-three years, the flow being expressed in cubic feet per second per square mile of drainage area:—

Flow of the Merrimack River at Lawrence in Cubic Feet per Second per Square Mile.

MONTH.	1917.	1918.	1919.	1920.	1921.	1922.	Mean for Forty-three Years, 1880-1922.
January	1.023	.466	1.314	.570	1.679	.830	1.267
February . . . . .	.770	.819	.872	.618	.995	.887	1.362
March	2.316	1.983	3.383	4.082	3.689	3.900	2.795
April	3.242	3.337	2.542	6.002	2.700	4.903	3.473
May	2.124	1.540	2.741	3.545	1.957	2.887	2.228
June	3.037	.757	1.007	1.607	.597	3.006	1.291
July	1.024	.553	.539	.746	1.031	2.111	.780
August . . . . .	.629	.470	.401	.673	.683	.773	.664
September . . . . .	.549	.847	.653	.680	.425	.766	.649
October . . . . .	.613	.991	.699	1.051	.475	.660	.803
November . . . . .	.882	1.126	1.648	.921	1.057	.612	1.103
December . . . . .	.569	1.492	1.331	3.258	1.652	.498	1.260
Average for whole year	1.398	1.198	1.427	1.980	1.412	1.819	1.473
Average for driest six months . . . . .	.711	.791	.825	.947	.711	.903	.877

Sudbury, Nashua and Merrimack Rivers.

The following table shows the weekly fluctuations during the year 1922 in the yield of the Sudbury River at Framingham and the South Branch of the Nashua River at the outlet of the Wachusett Reservoir, Clinton, and the flow of the Merrimack River at Lawrence. The flow of these streams, particularly that of the Sudbury River and of the South Branch of the Nashua River, serves to indicate the flow of other streams in eastern Massachusetts. The area of the Sudbury River watershed is 75.2 square miles, of the South Branch of the Nashua River 118.19 square miles, and of the Merrimack River 4,452 square miles.

Table showing the Average Weekly Flow of the Sudbury, South Branch of the Nashua and the Merrimack Rivers for the Year 1922, in Cubic Feet per Second per Square Mile of Drainage Area.

WEEK ENDING SUNDAY —	CUBIC FEET PER SECOND PER SQUARE MILE.			WEEK ENDING SUNDAY —	CUBIC FEET PER SECOND PER SQUARE MILE.		
	Yield of Sudbury River.	Yield of South Branch, Nashua River.	Flow of Merrimack River.		Yield of Sudbury River.	Yield of South Branch, Nashua River.	Flow of Merrimack River.
Jan. 1	1.092	1.174	1.134	July 2	2.600	3.256	4.543
8 . . . .	.505	.986	.916	9	1.938	4.877	3.248
15 . . . .	.764	1.189	.853	16	1.291	1.411	1.889
22 . . . .	.556	.943	.789	23 . . . .	.676	2.228	1.532
29 . . . .	.256	.638	.742	30 . . . .	.438	.941	1.221
Feb. 5	1.024	1.630	.829	Aug. 6 . . . .	.281	1.303	.835
12 . . . .	.881	1.244	1.012	13 . . . .	.254	.758	.924
19 . . . .	.654	.998	.771	20 . . . .	.315	.909	.688
26	1.974	2.117	.890	27 . . . .	.309	1.401	.597
Mar. 5	1.421	1.648	.881	Sept. 3	1.406	1.021	.842
12	6.871	7.666	3.730	10	2.087	1.412	.696
19	3.076	4.051	4.220	17	1.592	1.137	.796
26	3.889	5.920	4.170	24 . . . .	.462	.446	.914
Apr. 2	3.776	5.158	6.094	Oct. 1 . . . .	.120	.253	.621
9	5.023	5.861	4.706	8 . . . .	.377	.785	.494
16	3.542	4.460	7.565	15 . . . .	.868	1.069	.810
23	2.175	2.870	4.728	22 . . . .	.138	.253	.672
30	1.261	1.472	2.487	29 . . . .	.395	.665	.696
May 7	5.014	5.924	3.300	Nov. 5 . . . .	.380	.567	.594
14	2.768	2.428	4.106	12 . . . .	.779	1.172	.615
21	2.578	3.381	2.450	19 . . . .	.496	.696	.616
28	1.408	1.381	2.331	26 . . . .	.618	.907	.700
June 4 . . . .	.932	1.165	1.167	Dec. 3 . . . .	.496	.576	.530
11 . . . .	.525	1.768	1.912	10 . . . .	.518	.722	.499
18	1.425	2.159	1.424	17 . . . .	.645	1.060	.518
25	5.741	7.428	5.664	24 . . . .	.502	.672	.500
				31 . . . .	.843	1.093	.492

EXAMINATION OF RIVERS.

Aberjona River.

The results of the analyses of samples of water from the Aberjona River at Winchester show about the same conditions as found last year. At other points along the upper portions of the main stream the conditions were not greatly different from previous years so far as inorganic pollution is concerned, but there are four tanneries outside of the sewer districts in the upper portion of the watershed of this stream from which considerable quantities of waste have been discharged during the past year. Attempts have been made to treat these wastes and thus prevent

the pollution of the streams, but the treatment has not been satisfactory and large quantities have overflowed during the past year, causing serious complaint.

The satisfactory purification of these wastes would be difficult and costly and, since a plan has been recommended for the construction of a sewer in this valley which would remove all such wastes, there has been hesitation in the matter of constructing individual disposal works. These sources of pollution are in violation of existing laws, however, and if sewerage facilities are to be provided in this important and growing industrial valley the plan should be adopted without further delay and the present uncertainty as to the necessity for constructing individual treatment works removed. An appropriation of \$150,000 has already been made for a new Metropolitan sewer into which the sewage from the territory under consideration would discharge.

Assabet River.

The results of the analyses of samples of water from the Assabet River show in general an improvement throughout its course due largely to the heavy rainfall during the past year, especially in the summer months. Nevertheless, the river is considerably polluted by imperfectly purified sewage and manufacturing waste at several points, though its condition has not been such at any point in its course during the past year as to result in complaint to this Department. Towards the end of the year the Department recommended a considerable increase in the area of filter beds for the town of Westborough. The stream from the Westborough filter beds to Northborough is very flat and a project has been under consideration during the past year for lowering the channel in this portion of its course and for draining the adjacent meadows.

Blackstone River.

According to the results of the analyses of samples of water from the Blackstone River at various points throughout its course, the condition of this stream during the past year has remained about the same as during the past few years. Rapid progress is being made in the construction of works for the treatment of the sewage of Worcester and with the completion of these works a marked improvement in the condition of the river should result.

Charles River.

The Charles River below the entrance of Mine Brook from Franklin has been in somewhat better condition than formerly during the last few years, and the evidence of pollution from Franklin has been less marked than usual. Much sewage has been discharged into the river at Milford but the excessive flow of water has minimized its effect upon the condition of the river. The construction of the new sewage disposal works of the town of Milford has been begun and was about half completed at the end of the year.

The additional filter beds at the Medfield State Hospital were put into operation near the end of the year. Farther downstream the unusual flow of water has improved somewhat the condition of the stream as compared with former years.

Chicopee River.

Complaint has been made during the past year relative to the pollution of the Quaboag River, one of the main tributaries of the Chicopee, due to the overflow of sewage from the sewerage system of the town of Spencer. Towards the end of the year, work was begun by the town on the construction of additional filter beds for the purpose of preventing the further overflow of sewage into the Quaboag River, and investigations were initiated relative to the disposal of sewage from a sewer outlet in another portion of the town from which a small quantity of sewage reaches the river. The other tributaries of the Chicopee River, the Swift and Ware rivers, have shown but little change in condition during the past year.

Concord and Sudbury Rivers.

The Sudbury River is polluted by the discharge of a large quantity of foul waste from a mill in Saxonville, but on account of the excessive flow of water in the river this pollution has been less objectionable than usual during the past year.

The condition of the Concord River shows no material change from the previous year.

Connecticut River.

The results of the analyses have shown no change in the condition of the Connecticut River or any of its tributaries examined during the year.

French River.

No change has been noted in the condition of this stream during the past year and the stream continues to be polluted by sewage from Webster, plans for the disposal of which were approved by this Department some years ago.

Hoosick River.

This stream appears to have been in better condition during the past year than for some time, the most marked improvement being below Adams. The improvement apparently has been due chiefly to the excessive rainfall. The river continues to be very seriously polluted by sewage and manufacturing waste from North Adams to the State line.

Housatonic River.

The condition of the Housatonic River during the past year appears to have remained about the same as in the last few years, the effect of the heavy rainfall having counteracted the pollution caused by the increasing quantities of sewage overflowing without treatment from the Pittsfield sewerage system.

Merrimack River.

The results of the analyses of samples of water from the Merrimack River above Lowell and above Lawrence show a slightly smaller degree of pollution than during recent years, due no doubt to a greater flow of water. Below Lawrence the river is still badly polluted though the effect of the pollution was not as marked during the past year as in previous years, and the same was true of its condition above Haverhill in most respects, but complaint has been made of an excessive amount of tar and other offensive floating matter on the river at that point and the complaint is now under investigation.

Millers River.

The results of the analyses of samples of water from the Millers River at various points along its course show that the water of this stream was better than in any recent year.

Nashua River.

The Nashua River at a point below Fitchburg but above the entrance of the effluent from the sewage disposal works has shown more evidence of pollution than in 1921, but less than in any other year since records are available. Below the entrance of the effluent from the Fitchburg sewage disposal works the results of the analyses indicate that the condition of the river has been better than in any recent year. The great dilution caused by the excessive rainfall has made Monoosnock Brook below Leominster less offensive than usual, but the improvement in the main stream below Leominster has not been as great as has been the case below Fitchburg. There are evidences of considerable increase in pollution as the river

passes Leominster, due to the discharge of all but an insignificant portion of the sewage of the city without treatment, though farther down the river at its confluence with the South Branch the analyses again show less pollution than in any recent year. The South Branch at a point below Clinton but above the entrance of the effluent from the Clinton sewage filter beds has been less polluted during the past year than in any recent year, but there is marked evidence of an increase in pollution below the entrance of the effluent from the Clinton filter beds. The main stream below the confluence of these two branches has shown an improvement as compared to recent years, and this is also the case further down its course.

Neponset River.

In general the condition of the Neponset River, as indicated by analyses of the water, has been less objectionable than usual during the past year, and at its mouth at Milton Lower Mills the quantity of ammonias and chlorine, as shown by the analyses, has been less than at any time during the last 20 years. This improvement is no doubt due largely to the excessive rainfall and to the unusual flow of water during the greater part of the year.

Hawes Brook, one of the tributaries of the river in Norwood, is still grossly polluted, and serious complaint has been made as to the condition of the river in that part of its course between Hawes Brook and the junction of the Canton River. This objectionable condition has been due to the manufacturing waste discharged into Hawes Brook and to imperfectly purified sewage from the town of Norwood.

Taunton River.

The Taunton River and its tributaries have been generally in better condition than at any time for several years, the Salisbury Plain River below Brockton and the Matfield River at its mouth showing a marked improvement. The Coweaset River below the filtration works of the city of Brockton, however, remained about the same as in the previous year.

North River in Peabody and Salem.

The condition of this stream, the most seriously polluted stream in the State, has been the subject of a special investigation during the past year, the results of which have been presented to the Legislature in a separate document.

The results of the analyses of samples from the other smaller rivers have shown no marked change during the year as compared to recent years other than the general effect due to abnormally high rainfall.

EXAMINATION OF SEWAGE DISPOSAL WORKS.

The following tables contain the averages of the results of analyses of samples of sewage and effluent together with statistics concerning the more important sewage disposal works in the State.

The quantity of sewage received at most of these works has increased over that of the past two years but, except in a few cases, it has been of about the usual character.

At Andover, the sewerage system was extended during 1920 to include Shawsheen Village, a rapidly growing district recently developed in the northerly part of the town. The entire quantity of sewage from Shawsheen Village and the Marland District has been discharged without treatment directly into the Shawsheen River during the year. The growth of the town has made necessary the abandonment of the present sewage disposal works, which have been inadequate for the purpose for several years, and further studies for the disposal of the sewage of the town are now being carried on.

At Brockton additional sewage disposal works comprising a series of settling tanks and $1\frac{1}{2}$ acres of trickling filters were practically completed in 1921 and have been in use during the year.

Plans have been approved during the year for additional sewage disposal works at Framingham, where the sewerage system is being extended to provide for the villages of Framingham Center and Saxonville.

At Milford additional sewage disposal works have been under construction during the year. The new works will consist of an Imhoff tank, trickling filter and secondary settling tanks. The filter beds, the underdrains of which were cleaned and re-laid in 1920, have been thoroughly cleaned and restored to proper operating condition.

At Spencer a filter bed has been constructed to care for the overflow of sewage which occurs at the head of the siphon leading to the sewage disposal area whenever the rate of flow of sewage is in excess of its capacity. The work on this new filter was practically completed at the end of the year.

At Stockbridge, where the quantity of sewage exceeds the capacity of the present disposal works, the construction of an additional filter bed was recommended late in the year.

The sewage disposal area of the town of Westborough also is inadequate for present requirements and an additional area of filters has been recommended.

At Norwood the sewage disposal works are inadequate for the proper treatment of the sewage, and a considerable pollution of the Neponset River is caused by imperfectly purified effluent from these works.

At several of the sewage disposal works, especially those at Clinton, Framingham, Milford, Natick, Norwood, Spencer and Westborough, the filters have been overloaded during the past year and considerable quantities of sewage have been allowed to overflow without treatment from sewerage systems at Andover, Easthampton, Leicester, Pittsfield, Southbridge, Spencer and Westborough.

At Worcester the construction of works for the treatment of the sewage, required by the provisions of Chapter 171 of the Special Acts of the year 1919, has been continued and a considerable portion of the work is approaching completion. The expenditures by the city during the year have been greater than required by the act and there is every reason to believe that the works will be completed within the time required.

TABLE No. 1. — *Average Results of the Analyses of Monthly Samples of Sewage as received at the Disposal Works. (Fats determined in about 72 Per Cent of the Samples.)*
[Parts in 100,000.]

CITY OR TOWN.	RESIDUE ON EVAPORATION.						AMMONIA.				Chlorine.	OXYGEN CONSUMED.		IRON.		Kjeldahl Nitrogen.	Fats.		
	TOTAL RESIDUE.			LOSS ON IGNITION.			Free.	ALBUMINOID.				Unfiltered.	Filtered.		Unfiltered.			Filtered.	
	Total.	Dissolved.	Suspended.	Total.	Dissolved.	Suspended.		Total.	Dissolved.	Suspended.			Unfiltered.	Filtered.				Unfiltered.	Filtered.
Andover	72.80	45.28	27.52	22.07	39.50	17.43	22.07	3.73	.71	.35	.36	6.48	3.42	.144	1.52	11.48			
ATTLEBORO ¹	43.86	32.57	11.29	8.77	20.29	11.62	8.77	3.67	.54	.27	.27	4.53	2.11	.249	1.14	6.96			
BROCKTON ²	60.96	43.76	17.20	19.21	32.41	19.21	13.20	3.99	.64	.34	.30	7.40	5.04	.320	1.85	6.96			
Clinton	114.25	77.48	36.77	27.50	64.80	37.30	27.50	2.63	1.01	.62	.39	13.20	8.28	.105	2.63	34.42			
Concord ³	33.17	25.87	7.30	11.84	17.07	11.84	5.23	2.88	.56	.30	.26	4.31	2.40	.149	1.08				
Easthampton ³	56.40	40.20	16.20	12.34	31.94	19.60	12.34	5.04	.82	.49	.33	5.94	3.52	.132	1.43				
FITCHBURG	52.15	30.70	21.45	16.67	30.80	14.13	16.67	1.86	.48	.26	.22	6.80	3.87	.248	1.30	7.52			
Frammingham ²	81.10	55.16	25.94	19.95	44.73	24.78	19.95	4.25	.76	.38	.38	8.14	5.11	.205	1.73	20.85			
Franklin ³	33.87	26.47	7.40	10.90	16.68	10.90	5.78	2.99	.48	.32	.16	3.03	1.73	.097	1.05				
Gardner (Gardner Area) ³	92.30	60.65	31.65	23.35	57.35	34.03	23.35	14.50	1.55	.98	.57	8.95	4.40	.153	3.33	11.01			
Gardner (Templeton Area)	75.27	35.78	39.49	30.60	45.77	15.17	30.60	5.92	.95	.50	.45	6.03	2.62	.216	2.21	8.28			
Hopedale ³	69.10	45.55	23.55	17.20	38.90	21.70	17.20	13.39	1.63	.77	.86	10.25	4.55	.150	2.68				
Hudson	115.42	94.22	21.20	39.50	23.44	16.06	7.09	2.68	1.14	.63	.51	8.71	5.10	.167	2.45	6.43			
Leicester ⁴	34.90	26.05	8.85	11.70	17.55	11.70	5.85	2.68	.38	.20	.18	4.11	2.03	.124	1.00				
Marion	24.43	18.80	5.63	9.02	13.52	9.02	4.50	1.32	.25	.15	.10	2.52	1.62	.090	.74				
MARLBOROUGH	63.15	45.15	18.00	15.57	32.10	16.53	15.57	4.26	.76	.45	.31	6.86	3.53	.215	1.56	8.53			
Milford ⁵	55.65	38.95	16.70	11.30	26.73	15.43	11.30	2.76	.46	.23	.23	6.66	3.13	.169	1.24				
Natick ²	54.75	43.03	11.72	25.77	16.07	9.70	3.00	3.00	.54	.30	.24	8.63	5.26	.185	1.19	4.83			
North Attleborough	27.53	22.93	4.60	10.43	7.60	2.83	1.13	2.55	.16	.09	.09	5.52	3.17	.084	.65				
Northbridge	46.27	26.23	20.04	28.23	12.63	15.60	4.58	4.58	.78	.53	.25	5.98	3.57	.143	1.63				
Norwood	99.32	77.63	21.69	37.55	22.03	15.52	6.56	2.36	.56	.25	.31	11.94	7.53	.163	1.26	7.75			
Pittsfield ²	38.55	32.78	5.77	18.37	14.56	3.81	2.07	3.81	.24	.25	.09	3.22	2.20	.086	.82	3.06			
Southbridge ³	63.74	40.11	23.63	35.60	16.91	18.69	5.36	3.76	.76	.39	.37	6.61	3.90	.159	1.60				
Spencer ³	31.17	24.63	6.54	15.37	10.87	4.50	2.24	2.24	.40	.24	.16	3.77	2.18	.114	.90	3.02			
Stockbridge ⁴	38.00	33.65	4.35	17.70	15.35	2.35	3.26	3.26	.25	.14	.11	2.39	1.86	.100	.43				
Westborough	48.30	35.17	13.13	23.52	13.97	9.55	2.13	2.13	.52	.26	.26	5.84	3.55	.167	1.24	5.84			
Worcester (day) ³	99.60	61.37	38.23	22.67	38.10	15.43	22.67	2.59	.87	.38	.49	10.50	4.22	.503	1.83				
Worcester (night)	87.06	58.26	28.80	37.40	17.23	17.23	20.17	1.72	.45	.15	.30	10.20	3.76	8.800	1.717				

1 Seven samples. 2 At pumping station. 3 Six samples. 4 Four samples. 5 Eight samples.

¹ Seven samples.² At pumping station.³ Six samples.⁴ Four samples.⁵ Eight samples.

TABLE No. 2. — Average Results of the Analyses of Monthly Samples of Sewage as applied to Filter Beds after Preliminary Treatment as indicated.
(Fats determined in about 72 Per Cent of the Samples.)

[Parts in 100,000.]

CITY OR TOWN.	Form of Preliminary Treatment.	RESIDUE ON EVAPORATION.						AMMONIA.				OXYGEN CONSUMED.		IRON.		Kjeldahl Nitrogen.	Fats.	
		TOTAL RESIDUE.			LOSS ON IGNITION.			Free.	Total.	ALBUMINOID.		Unfiltered.	Filtered.	Unfiltered.	Filtered.			
		Total.	Dissolved.	Suspended.	Total.	Dissolved.	Suspended.											
Andover	Tank	54.07	42.37	11.70	22.83	16.52	6.31	3.46	.45	.28	.17	9.19	3.27	4.38	.103	.068	1.01	5.57
ATTLEBORO ¹	None	43.86	32.57	11.29	20.29	11.52	8.77	3.67	.54	.27	.27	6.49	4.53	4.53	.949	.249	1.14	—
BROCKTON	Tanks	37.36	30.96	6.40	15.85	11.98	3.87	3.54	.37	.23	.14	6.80	2.34	4.73	.312	.221	.88	2.75
Clinton	Basins	63.94	56.36	7.58	31.88	26.30	5.58	2.24	.56	.39	.17	4.26	6.90	6.90	.137	.081	1.29	11.48
Concord ²	None	33.17	25.87	7.30	17.07	11.84	5.23	2.88	.56	.30	.26	4.06	4.31	4.31	.149	.078	1.16	—
Easthampton ²	Tanks	49.20	38.20	11.00	25.00	15.73	9.27	4.45	.63	.39	.24	6.77	5.00	3.00	.101	.062	1.21	—
Framburg	Imhoff tanks	33.77	28.08	5.69	14.89	11.46	3.43	1.98	.29	.20	.09	5.04	3.73	3.00	.197	.124	.83	3.13
Framingham ³	None	81.10	55.16	25.94	44.73	24.78	19.95	4.25	.76	.38	.38	9.87	8.14	5.11	.205	.073	1.73	20.85
Franklin ²	Tanks	21.77	18.34	2.43	8.02	6.47	1.85	1.07	.16	.11	.05	2.87	1.36	1.03	.106	.062	.37	—
Gardner (Gardner Area) ²	None	92.30	60.65	31.65	57.35	34.00	23.35	14.50	1.55	.98	.57	10.25	8.95	4.40	.153	.062	3.33	11.01
Gardner (Templeton Area)	Tanks	44.07	31.83	12.24	22.33	12.71	9.92	2.75	.44	.24	.20	6.11	4.35	2.71	.178	.090	.93	5.68
Hopedale ²	Tanks	49.13	37.03	12.10	27.86	17.70	10.16	6.39	.66	.36	.30	5.90	5.20	3.10	.235	.088	1.17	—
Hudson	Tanks	63.29	54.75	8.54	24.07	17.95	6.12	4.47	.46	.27	.19	14.68	4.15	2.65	.120	.074	1.08	4.55
Leicester ⁴	None	34.90	26.05	8.85	17.55	11.70	5.85	2.68	.38	.20	.18	4.11	3.13	2.63	.124	.048	1.00	—
Marion	None	24.43	18.80	5.63	13.52	9.02	4.50	1.32	.25	.15	.10	2.74	2.52	1.62	.090	.051	.74	—
MARLBOROUGH	Tanks	45.72	39.00	6.72	20.72	15.05	5.67	3.16	.45	.27	.18	7.60	4.08	2.77	.172	.109	.98	3.86
Milford ⁵	Tanks	46.73	35.43	11.30	15.30	11.00	4.30	2.18	.29	.19	.10	6.31	3.02	1.78	.153	.066	.77	—
Natick ³	None	54.75	43.03	11.72	25.77	16.07	9.70	3.00	.54	.30	.24	8.63	5.26	3.17	.185	.058	1.19	4.93
North Attleborough	Tanks	19.87	18.53	1.34	7.17	6.50	0.67	1.05	.14	.08	.06	3.85	.98	.83	.151	.065	.42	—
Northbridge	Tanks	18.90	15.90	3.00	8.93	7.20	1.73	2.08	.25	.14	.11	2.51	2.90	1.47	.103	.070	.61	—
Norwood	Tank	87.22	51.47	35.75	37.45	14.76	22.69	2.24	.73	.27	.46	15.25	8.99	3.92	.366	.115	1.51	8.42
Pittsfield ³	None	38.55	32.78	5.77	18.37	14.56	3.81	2.07	.34	.25	.09	4.25	3.20	2.20	.086	.045	.82	3.06
Southbridge ²	Tanks	54.93	41.20	13.73	27.77	16.52	11.24	5.31	.59	.24	.35	9.32	3.03	3.03	.261	.114	1.24	—
Spencer ²	None	31.17	24.63	6.54	15.37	10.87	4.50	2.79	.40	.24	.16	3.77	2.07	2.18	.114	.053	.90	3.02
Stockbridge ⁴	None	38.00	33.65	4.35	17.70	13.35	2.35	3.26	.25	.14	.11	4.38	2.39	1.80	.100	.043	.59	—
Westborough	None	48.30	35.17	13.13	23.52	13.97	9.55	2.13	.52	.26	.26	6.70	5.84	3.55	.167	.079	1.24	5.84
Worcester (day) ²	Tanks	99.60	61.37	38.23	38.10	15.43	22.67	2.59	.87	.38	.49	12.02	10.30	4.22	5.063	1.063	1.83	—

¹ Seven samples.² Six samples.³ At pumping station.⁴ Four samples.⁵ Eight samples.

TABLE NO. 3. — *Efficiency of Settling Tanks and Other Forms of Preliminary Treatment as indicated by the Foregoing Tables.*
 [Parts in 100,000.]

CITY OR TOWN.	Form of Preliminary Treatment.	SUSPENDED SOLIDS.			TOTAL ALBUMINOID AMMONIA.			OXYGEN CONSUMED.			FATS. ¹		CHLORINE.	
		Raw Sewage.	Settled or Treated Sewage.	Per Cent removed.	Raw Sewage.	Settled or Treated Sewage.	Per Cent removed.	Raw Sewage.	Settled or Treated Sewage.	Per Cent removed.	Raw Sewage.	Settled or Treated Sewage.	Raw Sewage.	Settled or Treated Sewage.
Andover	Tank	27.52	11.70	57	.71	.45	37	6.48	4.38	32	11.48	5.57	10.21	9.19
Brockton	Tanks	17.20	6.40	63	.64	.37	42	7.40	3.78	49	6.96	2.75	9.23	6.80
Clinton	Basins	36.77	7.58	79	1.01	.56	45	13.20	6.90	48	34.42	11.48	6.00	4.26
Easthampton	Tanks	16.20	11.00	32	.82	.63	23	5.94	5.00	16	—	—	6.00	6.77
Fitchburg	Imhoff tanks	21.45	5.69	73	.48	.29	40	6.50	3.73	43	7.52	3.13	5.05	5.04
Franklin	Tanks	7.40	2.43	67	.48	.16	67	3.03	1.36	55	—	—	4.73	2.87
Gardner (Templeton Area)	Tanks	39.49	12.24	69	.95	.44	54	6.03	4.35	28	8.28	5.68	6.53	6.11
Hopedale	Tanks	23.55	12.10	49	1.63	.66	60	10.25	5.20	49	—	—	8.12	5.90
Hudson	Tanks	21.20	8.53	60	1.14	.48	60	8.71	4.15	52	6.43	4.55	30.01	14.68
MAELBOROUGH	Tanks	18.00	6.72	63	.76	.45	41	6.86	4.08	41	8.53	3.86	10.21	7.80
Milford	Tanks	16.70	11.30	32	.46	.29	37	5.29	3.02	43	—	—	6.66	6.31
North Attleborough	Tanks	4.60	1.34	71	.25	.14	44	1.83	0.98	46	—	—	5.52	3.85
Northbridge	Tanks	20.04	3.00	85	.78	.25	68	5.98	2.00	67	—	—	3.87	3.51
Norwood	Tank	21.69	35.76	—	.56	.73	—	11.94	8.09	32	7.75	8.42	25.56	15.25
Southbridge	Tanks	23.63	13.73	42	.76	.59	22	6.61	5.03	24	—	—	8.50	9.32
WORCESTER	Chemical precipitation	28.80	9.17	68	.45	.18	60	10.20	2.46	76	—	—	9.06	6.64

¹ Fats determined in about 72 per cent of the samples.

TABLE No. 4. — *Average Results of the Analyses of Monthly Samples of Sewage applied to the Trickling Filters at Brockton and Fitchburg, and of their Effluents, etc. Per Cents removed, etc.*BROCKTON.¹

[Parts in 100,000.]

	RESIDUE ON EVAPORATION.						AMMONIA.			Chlorine.		NITROGEN AS —		OXYGEN CONSUMED.		Kjeldahl Nitrogen.	Fats.	Remarks.
	TOTAL RESIDUE.			LOSS ON IGNITION.			Free.	ALBUMINOID.		Nitrates.	Nitrites.	Unfiltered.	Filtered.					
	Total.	Dissolved.	Suspended.	Total.	Dissolved.	Suspended.												
Settled sewage as applied to trickling filter.	37.36	30.96	6.40	15.85	11.98	3.87	3.54	.37	.23	.14	6.80	-	3.78	2.34	.88	2.75	The trickling filter now has an area of 2 acres and a depth of 10 feet of crushed stone from 1.5 to 3 inches in size, but only one acre is used.	
Effluent from trickling filter	41.15	34.04	7.11	16.71	12.91	3.80	2.71	.31	.16	.15	7.07	.9677	3.50	1.96	.71	2.28	The average rate of operation was about 1,767,000 gallons per acre per day.	
Per cent removed	-	-	-	-	-	2	23	16	30	-	-	-	7	16	19	17	All sewage that is discharged to the trickling filter passes through settling tanks with a sedimentation period of 1.75 hours.	
Settled effluent from trickling filter.	41.11	35.09	6.02	16.07	12.51	3.56	3.01	.24	.14	.10	7.93	1.1501	3.28	2.17	.63	1.67		
Per cent removed by tank	.1	-	15	4	3	6	-	23	13	33	-	-	6	-	12	27		
Per cent removed by trickling filter and settling tank.	-	-	6	-	-	8	15	35	39	28	-	-	13	7	28	39	Period of sedimentation in the secondary settling tanks averaged about 2 hours. Tank cleaned once a week.	

¹ Operation of new works started this year, making results abnormal.

TABLE NO. 4. — Average Results of the Analyses of Monthly Samples of Sewage applied to the Trickling Filters at Brockton and Fitchburg, and of their Effluents, etc. Per Cents removed, etc. — Concluded.

FITCHBURG.

[Parts in 100,000.]

	RESIDUE ON EVAPORATION.						AMMONIA.				Chlorine.	NITROGEN AS —		OXYGEN CONSUMED.		Kjeldahl Nitrogen.	Fats.	Remarks.
	TOTAL RESIDUE.			LOSS ON IGNITION.			Free.	ALBUMINOID.				Nitrates.	Nitrites.	Unfiltered.	Filtered.			
	Total.	Dissolved.	Suspended.	Total.	Dissolved.	Suspended.												
Imhoff tank effluent as applied to trickling filter.	33.77	28.08	5.69	14.89	11.46	3.43	1.98	.29	.20	.09	5.04	—	3.73	3.00	.83	3.13	The trickling filter has an area of 2.14 acres and a depth of 10 feet of stone from 1 to 3 inches in size.	
Effluent from trickling filter	31.50	27.65	3.85	13.97	11.58	2.39	.55	.14	.08	.06	4.93	.9960	1.69	1.20	.49	—		
Per cent removed	7	2	32	6	—	30	72	52	60	33	—	—	55	60	41	—		
Settled effluent from trickling filter as discharged to Nashua River.	29.35	26.33	3.02	12.90	10.97	1.93	.57	.12	.07	.05	4.76	.9670	1.49	1.10	.40	—	The average rate of operation was about 1,824,000 gallons per acre per day for area used (1.86 acres).	
Per cent removed by secondary settling tanks.	7	5	22	8	5	19	—	14	13	17	—	—	12	8	18	—		
Per cent removed by trickling filter and settling tanks.	13	6	47	13	4	44	71	59	65	44	—	—	60	63	52	—		

The trickling filter has an area of $2\frac{1}{4}$ acres and a depth of 10 feet of stone from 1 to 3 inches in size.

The average rate of operation was about 1,824,000 gallons per acre per day for area used (1.86 acres).

TABLE NO. 5. — *Average Results of Analyses of Monthly Samples of Effluent from Sand Filters.*

[Parts in 100,000.]

CITY OR TOWN.	Free Ammonia.	Total Albuminoid Ammonia.	Chlorine.	NITROGEN AS —		Iron.
				Nitrates.	Nitrites.	
Andover ¹	2.35	.0894	7.43	.2748	.0265	.444
ATTLEBORO ²	.39	.0635	5.45	.9450	.0282	.022
BROCKTON ¹	3.95	.0620	8.69	.2069	.0035	1.521
Clinton ¹	2.58	.0852	3.91	.0974	.0007	2.090
Concord	.02	.0194	3.89	.7706	.0003	.017
Easthampton	.13	.0350	4.87	1.4308	.0540	.191
Framingham ¹	3.32	.0919	8.99	.1097	.0037	1.479
Franklin ²	.60	.0523	4.58	.7603	.1108	.146
Gardner (Gardner Area) ³	3.94	.1430	6.90	1.7572	.0470	.673
Gardner (Templeton Area)	2.87	.1499	8.84	.7651	.0262	.283
Hopedale ¹	2.62	.1063	5.49	1.9815	.0025	.072
Hudson	.96	.0820	13.18	1.1845	.0295	.181
Leicester	.92	.0716	3.80	1.0317	.0052	.227
Marion	.59	.0316	2.83	.2487	.0123	.016
MARLBOROUGH ¹	.60	.0596	6.48	1.4732	.0062	.059
Milford	.97	.0423	5.89	.9573	.0108	.286
Natick	2.60	.0593	6.88	.0917	.0011	.855
North Attleborough ²	.08	.0126	2.98	.4770	.0053	.022
Northbridge ²	.44	.0377	2.92	.7845	.0099	.045
Norwood	1.45	.0593	12.36	.1162	.0215	.494
PITTSFIELD ¹	1.21	.0824	4.40	.5728	.0102	.296
Southbridge ⁴	4.39	.0901	7.09	.0484	.0001	1.522
Spencer ²	.11	.0213	3.52	.3725	.0068	.045
Stockbridge ⁴	.60	.0564	3.36	.5565	.0151	.091
Westborough ¹	1.68	.0618	5.93	.0366	.0020	.926
WORCESTER ²	1.49	.1063	11.25	.8377	.0140	1.342

¹ Regular samples from two or more underdrains in one average.² Six samples.³ Four samples.⁴ Nine samples.

TABLE NO. 6. — *Efficiency of Sand Filters (Per Cent of Free and Albuminoid Ammonia removed).*

[Parts in 100,000.]

CITY OR TOWN.	FREE AMMONIA.			TOTAL ALBUMINOID AMMONIA.			CHLORINE.		Rate of Operation with Even Distribution (Gallons per Acre per Day). ¹
	Applied Sewage.	Effluent.	Per Cent removed.	Applied Sewage.	Effluent.	Per Cent removed.	Applied Sewage.	Effluent.	
Andover	3.46	2.35	32	.45	.09	80	9.19	7.43	69,000
ATTLEBORO	3.67	3.39	89	.54	.06	89	6.49	5.45	46,000
BROCKTON	3.54	3.95	-	.37	.06	84	6.80	8.69	46,000
Clinton	2.24	2.58	-	.56	.09	84	4.26	3.91	60,000
Concord	2.88	.02	99	.56	.02	96	4.06	3.89	102,000
Easthampton	4.45	.13	97	.63	.04	94	6.77	4.87	-
Framingham	4.25	3.32	22	.76	.09	89	9.87	8.99	56,000
Franklin	1.07	.60	44	.16	.05	69	2.87	4.58	86,000
Gardner (Gardner Area)	14.50	3.94	73	1.55	.14	91	10.25	6.90	80,000
Gardner (Templeton Area)	2.75	2.87	-	.44	.15	66	6.11	8.84	
Hopedale	6.39	2.62	59	.66	.11	83	5.90	5.49	22,000
Hudson	4.47	.96	78	.46	.08	83	14.68	13.18	58,000
Leicester	2.68	.92	66	.38	.07	82	4.11	3.80	-
Marion	1.32	.59	55	.25	.03	88	2.74	2.83	153,000
MARLBOROUGH	3.16	.60	81	.45	.06	87	7.60	6.48	55,000
Milford	2.18	.97	56	.29	.04	86	6.31	5.89	59,000
Natick	3.00	2.60	13	.54	.06	89	8.63	6.88	69,000
North Attleborough	1.05	.08	92	.14	.01	93	3.85	2.98	116,000
Northbridge	2.08	.44	79	.25	.04	84	2.51	2.92	52,000
Norwood	2.24	1.45	35	.73	.06	92	15.25	12.36	123,000
PITTSFIELD	2.07	1.21	42	.34	.08	76	4.25	4.40	79,000
Southbridge	5.31	4.39	17	.59	.09	85	9.32	7.09	119,000
Spencer	2.79	.11	96	.40	.02	95	3.77	3.52	-
Stockbridge	3.26	.60	82	.25	.06	76	4.38	3.36	-
Westborough	2.13	1.68	21	.52	.06	88	6.70	5.93	85,000
WORCESTER	2.59	1.49	43	.87	.11	87	12.02	11.25	50,000

¹ See also Table No. 7.

TABLE No. 7. — *Extent of Sewerage Works, Rate of Flow, and Rate of Operation of Sand Filters.*

City or Town.	Popu- lation, Census of 1920.	Approxi- mate Length of Sanitary Sewers (Miles).	Approxi- mate Number of House Con- nections.	ESTIMATED QUANTITY OF SEWAGE TREATED (GALLONS PER DAY).			Estimated Average Quantity of Sewage per Connection (Gallons per Day).	Net Area of Filter Beds (Acres).	Estimated Rate of Operation with Even Dis- tribution (Gallons per Acre per Day).
				Average for Year.	Average for Month Maximum Flow.	Average for Month Minimum Flow.			
Andover	8,268	—	—	253,000 ¹	320,000	193,000	—	3.65	69,000
ATTLEBORO	19,731	30.88	1,219	719,000	980,000	854,000	500	15.80	46,000
BROCKTON	66,264	91.91	6,800	3,485,000 ²	—	—	512	37.00	46,000
Clinton	12,979	23.82	1,671	1,583,000 ¹	2,089,000	773,000	947	26.23	60,000
Concord	6,461	8.95	469	437,000	549,000	323,000	932	4.28	102,000
Easthampton	11,261	19.55	1,260	— ¹	—	—	—	2.20	—
Fitchburg	41,029	—	—	3,893,000 ³	—	—	—	—	—
Frammingham	17,083	26.68	2,423	1,191,000	1,464,000	1,010,000	492	21.12	56,000
Franklin	6,497	16.00	644	279,000	394,000	183,000	433	3.24	86,000
Gardner	16,971	31.10	1,879	1,000,000 ³	—	—	532	12.50	80,000
Hopedale	2,777	—	—	—	—	—	—	3.79	—
Hudson	7,607	11.50	748	525,000	698,000	462,000	702	9.00	58,000
Marion	1,288	3.93	171	115,000 ¹	143,000	72,000	673	.75	153,000
MARLBOROUGH	15,028	33.70	2,300	1,142,000	1,959,000	562,000	497	20.90	55,000
Milford	13,471	18.37	1,380	545,000	—	476,000	395	9.30	55,000
Natick	10,907	15.88	1,454	874,000	1,360,000	791,000	609	12.60	69,000
North Attleborough	9,238	16.71	654	814,000	859,000	736,000	1,245	7.00	116,000
Northbridge	10,174	21.00	800	629,000	642,000	592,000	788	12.00	52,000
Norwood	12,627	20.00	1,315	1,300,000 ³	—	—	989	10.54	123,000
PITTSFIELD	41,765	62.70	5,023	3,233,000 ¹	3,272,000	2,223,000	644	41.15	79,000
Southbridge	14,245	17.50	1,184	1,015,000 ¹	1,040,000	—	859	8.50	119,000
Spencer	5,930	10.00	532	492,000 ¹	—	—	923	9.30	—
Westborough	5,789	17.00	—	492,000 ¹	619,000	324,000	—	5.80	85,000
WORCESTER	179,754	190.18 ⁴	—	3,310,000 ⁵	—	—	—	66.80	50,000

¹ Entire quantity of sewage not treated.² Includes quantity treated by trickling filter.³ Data for months of maximum and minimum flow not complete.⁴ Includes 69.81 miles of combined sewers.⁵ Amount treated by sand filters. Total flow, 22,550,000 gallons per day.

TABLE No. 8. — *General Features.*

[For data concerning the trickling filters at Brockton and Fitchburg see Table No. 4.]

CITY OR TOWN.	Year of Construction of and Additions to Works.	Depth of Under-drains (Feet).	Distance of Apart of Under-drains (Feet).	Filtering Material.	Attention given to Disposal Works.
Andover	1898	4	20	Fair sand, small quantity of gravel; practically all handled in construction.	One man all the time.
ATTLEBORO	1912, 1913	4-7	35	Excellent sand and gravel; found in place	One man all the time; others when necessary.
BROCKTON	1893, 1905, 1908, 1912	5.5	30	Good sand and gravel; found in place	Four men all the time; large force when necessary.
Clinton	1899	8	60-70	Good sand and gravel; found in place	Two men all the time; others when necessary.
Concord	1903	none	—	Good sand underlaid with gravel; found in place	One man once a day.
Easthampton	1908	3.5	20-40	Good sand and gravel; largely found in place	One man all the time; one other when necessary.
Frammingham	1890	4-4.5	30-40	Good sand and gravel	Three or more men in summer; only one in winter.
Franklin	1915	4.5	26	Good sand and gravel	One man every two or three days; others when necessary.
Gardner (Gardner area)	1891	5	20	Good sand; handled in construction	One man all the time; others when necessary.
Gardner (Templeton area)	1901, 1909	3-4	20-30	Coarse sand; handled in construction	One man all the time; more when necessary.
Hopedale	1900	3	35-60	Some good sand and some rather fine sand	One man all the time.
Hudson	1904, 1910	5-6	50-100	Good sand and gravel; found in place	One man all the time; others when necessary.
Leicester	1894	4	8	Hard, compact sand; found in place	Very little attention.
Marion	1906	5	—	Mostly good sand; pockets of fine sand and some ledge, largely found in place.	One man every day in summer; every other day in winter.
MARLBOROUGH	1891, 1908, 1909, 1910, 1911	4.5-6	30-50	Rather fine sand; found in place	One man all the time; others when necessary.
Milford	1907	5	40	Sand of good quality, but strata of very fine sand in places; found in place.	One man every day; others when necessary.
Natick	1896	6	36	Coarse sand and gravel; mostly found in place	One man all the time; others when necessary.
North Attleborough	1909, 1910	5-6.5	55	Coarse sand and gravel; largely handled in place	One man every day; others when necessary.
Northbridge	1905, 1907, 1920	4	50-75	Good sand and gravel; found in place	Two men all the time; others when necessary.
Northwood	1909, 1918	4-6	—	Good sand; mostly found in place	One man every day; others when necessary.
Pittsfield	1901, 1915	4	35	Fair sand and gravel; considerable quantity handled, some found in place.	Two men all the time; others when necessary.
Southbridge	1908	4	40	Good sand and gravel; largely found in place	One man once a day.
Spencer	1897	-1	—	Sand filters, good quality sand	One man all the time; others when necessary.
Stockbridge	1899	3-4.5	23	Irrigation area, rather fine sand	One man all the time.
Westborough	1892, 1911	5	30-40	Good sand and gravel; handled in construction	One man all the time; others when necessary.
WORCESTER	1898 ²	4-6	35-50	Good sand and gravel; largely found in place	Several men all the time; a large force when necessary.

¹ Only three beds underdrained.² Year of first construction of sand filters. Many additions.

REPORT OF DIVISION OF WATER AND SEWAGE LABORATORIES.

During the year 1922 the Division of Water and Sewage Laboratories was engaged in its usual routine and research work. In pursuance of this work the Division made 8,503 complete chemical, 4,131 bacterial and 2,233 microscopical analyses of water, sewage, filter effluents, etc. Several hundred partial analyses were also made in connection with necessary studies of lead poisoning, corrosion, etc., etc. These analyses are a necessary part of the work of the Department in order that (1) it may keep informed in regard to the quality of the water supplies, condition of the rivers, and the efficiency of municipal water and sewage filtration areas of the state; (2) in order to furnish data for use in replying to the many applications to the Department from cities, towns, corporations, individuals, etc., for sanitary engineering or other sanitary information. During the year 208 applications of this nature were received by the Department and few of these applications can be answered except with the aid of analytical data furnished by the laboratories of this Division. (3) In order that the Department may not only keep abreast with and contribute to the best sanitary knowledge of the day by its research work but also to be able to furnish correct and up-to-date information upon all new methods of water, sewage and waste purification, methods of analysis and other sanitary, chemical and engineering subjects.

A following table summarizes the analytical work of the Division during the year. The results of a large part of this work, especially at the State House laboratories, are given in the tables of average analyses in the report of the Division of Sanitary Engineering.

State House Laboratories.

Samples from public water supplies:	
Surface waters	2,342
Ground waters	1,076
Samples from domestic wells, ice supplies, etc.	430
Samples from rivers	1,016
Samples from sewage disposal works:	
Sewages	417
Effluents	586
Samples of wastes and effluents from factories	128
Samples of sea water from various locations	30
Miscellaneous samples (partial analyses)	210
	6,235
Microscopical examinations	2,233
Special examinations of water for manganese, lead, etc.	437
Other special examinations including field work	372
	3,042

Lawrence Experiment Station.

Chemical examinations on account of investigations concerning the disposal of domestic sewage and factory wastes, filtration and other treatment of water supplies and swimming pools	2,159
Mechanical and chemical examinations of sands	159
Determinations of dissolved oxygen, carbonic acid, hydrogen ion concentration, etc. (field work)	170

Bacterial examinations of water from public water supplies, rivers, sewage filter effluents, ice, swimming pools, and feces	1,933
Bacterial examinations in connection with methods of purification of sewage and water	2,126
Bacterial examination of shellfish	72
	<hr/> 6,619

During the year a large number of important investigations were made many of which cannot be summarized in this short report but mention can be made of the following:—

SALEM-PEABODY SEWERAGE.

A very complete study in connection with the Division of Sanitary Engineering of the Salem-Peabody sewerage system was made, this investigation having been ordered by the General Court. In this investigation much analytical work was carried on to determine the character of the wastes entering this system from tanneries, glue works, etc., the efficiency of the treatment plants in operation at these works, the cause of deposits accumulating in the sewers and clogging them, the character of these deposits and methods of preventing the entrance of chemicals tending to cause clogging. In this study much experimental work was necessary and the results of both analytical and experimental work have been given in a very complete report by the Director of this Division to the Department.

OIL REFINERIES.

For several years this Department has been called upon to examine and study into the cause of and means of prevention that can be adopted to prevent very serious nuisances caused by large oil refineries recently established in the state. This investigation has called for much field work and analyses of air for the determination of the sulphur gases present causing nuisances on account of their disagreeable odors, together with analyses of oil in connection with a study of the pollution of harbor waters, beaches in the vicinity of these works, etc., etc. Certain analyses were also necessary to determine the percentage of sulphur present in the crude oils treated in these refineries.

PULP MILL WASTES.

New studies were made of the character of wastes coming from pulp mills in the state and the action of these wastes upon streams. At present wood pulp mills treat either poplar, spruce or hemlock, the poplar being treated by the soda process and the spruce and hemlock by the sulphite process. Owing to the decrease in the supply of poplar the sulphite process is gaining materially over the soda process. Two classes of waste liquor are produced, one from each process. At many mills digester liquor from the soda process is evaporated and the used chemicals recovered, thus preventing the discharge of much waste liquor. The liquors from the sulphite process generally go to waste, that is, are discharged into the stream upon which the mill is located. Two typical pulp mills, one using the soda process and the other the sulphite process were studied and the results were as follows:—

In the pulp mill using the soda process, 2,500 pounds of soda ash are used for each charge in the digester; this soda being causticized 90 per cent before use and the residual calcium carbonate resulting from this process is used in sizing. Of the 2,500 pounds of soda used in each charge, about 500 pounds is new, whereas the remainder has been recovered from the black ash of previous digestions, the digester liquor having been evaporated and calcined. At this mill, about 5,000,000 gallons of this digester liquor are produced annually, of which only about 10 per cent is wasted, being lost during the washing of pulp after digestion, the remainder being evaporated for this recovery of chemicals. The analysis of this waste liquor from the soda process is as follows:—

[Parts in 100,000.]

Total solids (no suspended solids present)	13,200
Loss on ignition	7,210
Fixed solids	5,990

Alkalinity (methyl orange)	3,900
Free ammonia	3
Albuminoid ammonia	7
Oxygen consumed	2,760

Volume for volume, this liquor is perhaps one hundred times as deleterious to a stream as domestic sewage. It contains a large quantity of organic matter and its oxygen demand while comparatively slow, is enormous, perhaps twenty times that of average domestic sewage. In twenty-four hours, one gallon of this waste will absorb 10.78 grams, or 7,544 cubic centimeters of oxygen. It is so alkaline — practically 4 per cent — that it destroys bacterial life in the water into which it flows, and it is deadly to fish. Fortunately, the volume wasted is small and will probably decrease as the recovery of chemicals increases in favor.

At the sulphite plant examined none of the digester liquor is recovered, about 17,000,000 gallons being discharged annually into the stream on which the mill is located. In a few cases this liquor is concentrated by evaporation or is treated so that it becomes useful for certain purposes. It contains 400 parts in 100,000 of organic acid, which should make its recovery of value. During the World War, experiments were made looking to the recovery or manufacture of alcohol from it. An analysis of this waste from the sulphite process is as follows: —

[Parts in 100,000.]

Total solids (no suspended solids present)	7,410
Loss on ignition	6,630
Fixed solids	780
Alkalinity (methyl orange)	—80
Alkalinity (phenolphthalein)	—500
Sulphur dioxide (as sulphurous acid or sulphites)	40
Free ammonia	15
Albuminoid ammonia	6
Oxygen consumed	3,460

This waste is acid and contains practically as much organic matter as the soda process waste. Its oxygen demand on the stream it enters appears to be somewhat less and it is slightly less deadly to bacteria and to fish. In twenty-four hours one gallon of this waste will absorb 8.71 grams or 6,088 cubic centimeters of oxygen. There is no reason why the treatment of this liquor should not be demanded where sanitary conditions require it, as it probably can be evaporated and products recovered which would pay at least for the cost of treatment. Neither of these liquors can be satisfactorily treated by any known method of purification other than evaporation and recovery of bodies of value. They are exceedingly inimical to bacterial life and if mixed with sewage or other liquors and passed to filters they destroy the value of such filters.

HYDROGEN ION INVESTIGATION.

Of late the hydrogen ion concentration determination has come into prominence in sanitary and industrial work. In sanitary work its use has given better control of coagulation at a number of places where water is purified by the use of aluminum sulphate and rapid filtration. It is also believed to be of value in determining the comparative corrosive properties of various water supplies. In making the pH determinations the colorimetric method is used, this procedure being based upon methods and data elaborated by Dr. Mansfield Clark.

Briefly, the procedure consists in comparing the color produced by the proper indicator in a known volume of water with standards of known pH concentration. Both hydrogen ion and hydroxyl ion concentrations are commonly expressed as pH numbers, this being more convenient than using the actual concentration values. pH 7.00 represents neutrality, values above this figure represent alkalinity or hydroxyl ion concentration and values below represent acidity or hydrogen ion concentration. The pH number is the logarithm of the reciprocal of the hydrogen ion concentration and these pH numbers represent only the dissociated hydrogen and hydroxyl ions.

Most surface waters in Massachusetts contain one part or more in 100,000 of alkalinity, largely as calcium bicarbonate and yet their pH numbers are below 7.0 and they are therefore acid by this test, this being so because the bicarbonate present in them is very slightly dissociated while the free CO_2 present is relatively more dissociated. This acidity of surface waters is only noted by the most delicate means and practically only by the pH standards. The real acidity would be infinitesimal in ordinary acidimetry determinations or methods.

Studies were made by this Division of the use of this determination in water purification in Massachusetts especially by mechanical filters. The data acquired so far are not sufficient upon which to form a definite opinion but these determinations appear to be of considerable value in controlling coagulation with the soft waters of New England.

In the course of further work along this line, samples were collected from twenty-four public water supplies in eastern Massachusetts approximately every two weeks from April to September. A study of the results obtained seemed to show no definite relation between the pH, the color, free CO_2 and alkalinity or soap hardness. In a general way waters containing high amounts of carbonic acid gave comparatively low pH and those with high alkalinity a higher pH. This would seem to show that this determination is of little value in the ordinary chemical examination of such waters as studied. In all, 170 samples were collected from these supplies. pH and free carbon dioxide were determined immediately after collection and after the samples had stood in the laboratory twenty-four hours and ninety-six hours in order to determine whether or not accurate pH determinations could be made in the laboratory on samples shipped from a distance. The results were as follows:—

Of the surface water samples after standing twenty-four hours, 39 per cent showed an increased pH; 42 per cent a decreased and 19 per cent were unchanged. The average change was a decrease of .02. After standing ninety-six hours, 59 per cent showed an increase, 30 per cent a decrease and 11 per cent were unchanged, the average change being an increase of .13. The increase on standing can without doubt be attributed to a loss of the free carbon dioxide from the samples; the decrease cannot be explained so easily.

Of the ground water samples after standing twenty-four hours, 31 per cent showed an increased pH, 42 per cent a decreased and 27 per cent were unchanged. The average change was a decrease of .04. After standing ninety-six hours 56 per cent showed an increase, 22 per cent a decrease and 22 per cent were unchanged. The average change was an increase of .08.

The results seemed to show that if samples can be tested in the laboratory within twenty-four hours after collection, pH determinations are not likely to vary more than 0.1 or 0.2 from determinations made in the field. Samples containing a large number of organisms may on standing lose all free carbon dioxide and have the bicarbonate alkalinity change to carbonate by the action of the organisms. This may change the water from the acid to the alkaline side as shown by this determination.

TREATMENT AND FILTRATION OF WATER. HYDROGEN ION CONTROL.

During the year eleven filters were operated for the purpose of studying different methods of water purification. One of them, Filter No. 520, put into operation in May, 1921, is a mechanical filter; that is, a rapid rate filter receiving water which is first treated with aluminum sulphate. It is a very complete small filter of the true mechanical type. The Merrimack River water undergoing purification is first treated with aluminum sulphate varying from 1.5 to 3 grains per gallon during different portions of the year. The filter was operated during a considerable portion of the year at a rate of 50,000,000 gallons per acre daily and during a second period at a rate of 100,000,000 gallons per acre daily. The water after receiving the aluminum sulphate has had approximately three hours' storage in a coagulating basin. On several occasions during the year much trouble was experienced in obtaining

proper coagulation no matter how large an amount of sulphate was used or how much the alkalinity and hydrogen ion concentration of the water was varied. These periods were of very short duration, however. At times it has been necessary to add soda ash to the raw water in amounts equal to .3 of a grain per gallon. During the year an effort was made to keep the pH of the effluents over 6.0. If this pH was too high in the raw water poor coagulation resulted.

The best results were obtained during January and February when two grains of sulphate were being used without soda and the filter was being operated at the rate of 100,000,000 gallons per acre daily. During this period the reduction of total bacteria was 99.7 per cent and of *B. coli* 99.5 per cent. Even with this reduction, however, the *B. coli* score or the number of coli in 100 cubic centimeters was 24 compared with the United States Public Health standard of 2. The bacterial load upon the filters, however, was very great, the average 100 cubic centimeter *B. coli* score of the water applied being 5,200. During the year ninety-two runs were made with this filter. When operated at a rate of 100,000,000 gallons per acre daily the average length of the run was 12.7 hours and when operated at a rate of 50,000,000 gallons per acre daily, 22.9 hours. The wash water averaged from 2.50 to 2.75 per cent of the volume of water filtered.

The results of the operation of this filter seemed to show that the Merrimack River water is too heavily polluted at the present time bacterially to be successfully purified by mechanical filtration unless a coagulation and storage basin could be used large enough to give a storage not of hours but of days. This statement refers to bacterial purification only. The average color of the river water was .42 and of the effluent from the filter .08. In comparison with this rapid filter, slow sand Filter No. 519, also started in May, 1921, was operated with Merrimack River water which had first been treated with aluminum sulphate and given the same period of storage as the water applied to Filter No. 520. This filter operated at a rate of 5,000,000 gallons per acre daily filtered about three and one-half times as much water between scrapings as the mechanical filter between washings. The average removal of bacteria was much better than by mechanical Filter No. 520, the total number of bacteria in the effluent being 17 per cubic centimeter as compared with 105 per cubic centimeter in the effluent from the mechanical filter. The *B. coli* score was 3 as compared with 24 in the effluent from the mechanical filter.

The principal objection to slow sand filtration is that this method seldom removes from the comparatively clear but often highly colored waters of New England more than from 25 to 30 per cent of this color and hence does not produce a clear, sparkling, low colored and altogether attractive filtrate such as can be obtained from coagulation and rapid filtration of such waters. On the other hand the chief objections to the latter method when applied to these soft highly colored waters are the tendency of the method to increase the corrosive properties of the soft water treated, the difficulty with which, generally speaking, equally good bacterial results can be obtained as by slow sand filtration especially if the soft water is badly polluted, and the fact now again being widely commented upon that occasionally aluminum sulphate does pass through mechanical filters. Hence a process of water treatment which will produce a sparkling water of low color without materially increasing its corrosive properties has been much desired, and during the past few years such a process has been fairly well worked out at the Lawrence Experiment Station and is arousing general interest among all water purification authorities.

Briefly, the process consists of loading the sand of a slow sand filter with the ordinary coagulants used in mechanical filtration and operating such a filter generally at slightly more than the usual slow sand filter rates or about 5,000,000 or 6,000,000 gallons per acre daily. Such filters remove a large percentage of the organic matter, especially the coloring matter of the applied water, produce a clear, sparkling and attractive effluent and one containing no more carbonic acid than the raw water applied to the filters and with the alkalinity of the water slightly increased.

This method of water treatment has many advantages over the other methods and one drawback. The advantages are as follows: — (1) The corrosive properties

of the effluent are not increased or if so, not materially, and neither aluminum sulphate nor alumina is found in the filter effluent; (2) the aluminum hydroxide with which the filter is first loaded is regenerated whenever its color removal properties begin to fail and hence is used over and over again; that is, the primary cost for aluminum sulphate is practically the entire cost; (3) when receiving comparatively highly colored waters from storage reservoirs practically free from matters in suspension the method of filter regeneration or removal of stored color which we employ, removes practically all the organic matter from the surface of the filter as well as from its deeper portions and hence scraping of the surface is seldom required. Filters operated now for five years by us have theoretically used up to date, taking into consideration the amount of aluminum sulphate primarily placed in each filter and the volume of water filtered, about .2 of a grain of sulphate per gallon of water filtered or practically one-twelfth of the amount necessary per gallon in successful mechanical filtration of Merrimack River water such as applied to these loaded filters. So far the cost for aluminum sulphate with this new method has been about 55 cents per million gallons as compared with \$5 and \$7 per million gallons in mechanical filtration of the same water. The disadvantage is that these filters give poor bacterial results owing to the method of regeneration or removal of stored color, hence the method is particularly applicable to the treatment of such waters, the improvement of which physically is of more importance than bacterially. Their very clear, colorless effluents, however, can be rendered practically sterile with small amounts of chlorine. Most of the filters in use have been described in previous reports. As three new filters of this type, Nos. 523, 524 and 525, were started in May and June, 1922, they are described here. These filters contained $4\frac{1}{2}$ feet in depth of sand of an effective size of .12 millimeter.

In the sand of Filter No. 523, 55 tons per acre of finely ground calcium hydroxide and 5 per cent by volume of an artificial zeolite were mixed. The object of adding the zeolite was to see if it were possible to soften water in a filter of this type, regenerating the zeolite with the caustic soda treatment. It has not been possible to try this out as yet as this filter has not needed treatment with soda even after one hundred and fifty-four days' operation. Of course the zeolite became loaded with calcium salts from the loading of the filter with alum. The lime mixed with the sand was sufficient to precipitate 150 tons per acre of alum but as the zeolite contained a large excess of alkali, 20 tons more were added and still the effluent was quite alkaline.

Filter No. 524 was the same as Filter No. 523 except that an equivalent amount of ferric sulphate was added instead of alum; zeolite was not added to the filter.

The use of a solid alkaline substance such as the oxides, hydroxides or carbonates of calcium or magnesium mixed intimately with the sand to precipitate the alum has advantages over the use of soda ash in solution; that is, the alum or ferric sulphate may be precipitated in a much shorter time and more uniformly through the sand.

The following tables give some of the results obtained during the year by nine filters constructed of different grades of sand or loaded with aluminum hydroxide by different methods and in different amounts, all of which, however, have been operated at practically a 5,000,000-gallon per acre daily rate:—

	PER CENT REDUCTION BY FILTER NO.								
	488.	494.	496.	512.	514.	515.	523.	524.	525.
Color	71	67	54	64	67	69	88	81	91
Albuminoid Ammonia . . .	46	51	30	46	50	51	75	58	72
Oxygen Consumed	60	56	33	51	56	65	93	82	88

	PER CENT REMOVED BY NaOH FROM FILTER No.								
	488.	494.	496.	512.	514.	515.	523. ¹	524. ¹	525. ¹
Color	33	39	10	48	37	60	-	-	-
Albuminoid Ammonia	30	39	18	35	29	37	-	-	-
Oxygen Consumed	29	35	26	35	32	44	-	-	-

¹ Filters not yet treated.*Average Chemical Analyses.**Canal Water applied to Filters Nos. 488, 494, 512, 514, 515, 523, 524 and 525.*

(Parts in 100,000.)

Color.	AMMONIA.			NITROGEN AS —		Oxygen consumed.	Iron.	Carbon Dioxide.	pH.	Alkalinity.
	Free.	ALBUMINOID.		Nitrates.	Nitrites.					
		Total.	In Solution.							
.42	.0115	.0159	.0137	.021	.0003	.57	.046	0.3	6.4	0.9

Effluent from Filter No. 488.

.12	.0128	.0086	-	.026	.0007	.23	.014	0.3	6.6	1.4
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Effluent from Filter No. 494.

.14	.0130	.0078	-	.028	.0005	.25	.015	0.3	6.6	1.4
-----	-------	-------	---	------	-------	-----	------	-----	-----	-----

Effluent from Filter No. 496.¹

.06	.0035	.0057	-	.035	.0002	.16	.019	0.2	6.7	1.5
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Effluent from Filter No. 512.

.15	.0074	.0086	-	.027	.0005	.28	.017	0.4	6.5	1.4
-----	-------	-------	---	------	-------	-----	------	-----	-----	-----

Effluent from Filter No. 514.

.14	.0039	.0079	-	.029	.0006	.25	.015	0.4	6.5	1.7
-----	-------	-------	---	------	-------	-----	------	-----	-----	-----

Effluent from Filter No. 515.

.13	.0109	.0078	-	.028	.0004	.20	.019	0.3	6.5	1.4
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Effluent from Filter No. 523.

.05	.0025	.0040	-	.015	.0015	.04	.012	0.4	7.0	2.7
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¹ Receives combined effluent from Filters Nos. 488 and 494.

*Average Chemical Analyses — Concluded.**Effluent from Filter No. 524.*

[Parts in 100,000.]

Color.	AMMONIA.			NITROGEN AS —		Oxygen consumed.	Iron.	Carbon Dioxide.	pH.	Alkalinity.
	Free.	ALBUMINOID.		Nitrates.	Nitrites.					
		Total.	In Solution.							
.08	.0108	.0066	-	.008	.0008	.10	.045	0.0	6.9	3.0

Effluent from Filter No. 525.

.04	.0113	.0045	—	.009	.0046	.07	.019	0.3	6.6	1.8
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Effluent from Filter No. 518.¹

.10	.0026	.0057	—	.036	.0002	.17	.019	0.4	6.5	1.4
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Effluent from Filter No. 519.²

.06	.0066	.0055	—	.023	.0002	.13	.017	0.4	6.1	0.6
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Canal Water and Sewage applied to Filter No. 521.

.44	.0555	.0293	.0200	.018	.0004	.63	.063	—	—	1.0
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Effluent from Filter No. 521.³

.29	.0052	.0101	—	.046	.0004	.36	.036	—	—	1.0
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¹ Receives effluent from Filters Nos. 512, 514 and 515.² Slow sand filter receiving water treated first with aluminum sulphate.³ Operated at rate of 5,000,000 gallons per acre daily. See Report for 1921, pp. 135 and 136.

LAWRENCE CITY FILTERS.

The city of Lawrence takes its water supply from the Merrimack River which is polluted by the sewage and trade wastes of the cities and towns above Lawrence. Since 1893, this water has been purified by slow sand filtration and since 1918 the effluents from the filters have been treated with liquid chlorine. Two filters are in use; the older, 2.2 acres in area, is divided into three sections, two open and the other covered; the other filter, .75 of an acre in area, is covered.

The volume of water pumped during 1922 was 1,664,747,167 gallons, an average of 4,530,000 gallons daily. Liquid chlorine is applied at the pump-well, the average amount during the year being .41 parts per million.

The following tables present the average results of chemical and bacterial analyses of the Merrimack River water and the effluents from the filters: —

*Average Bacterial Analyses.**Merrimack River. — Intake of the Lawrence City Filters.*

BACTERIA PER CUBIC CENTIMETER.			PER CENT OF BACTERIA REMOVED.			PER CENT OF SAMPLES CONTAINING B. COLI.					B. Coli in 100 c.c.
Four Days, 20° C.	TWENTY-FOUR HOURS, 37° C.		Four Days, 20° C.	TWENTY-FOUR HOURS, 37° C.		.001 c.c.	.01 c.c.	0.1 c.c.	1.0 c.c.	10 c.c.	
	Total.	Red.		Total.	Red.						
5,500	710	171	-	-	-	0	64	100	100	-	6,900

Effluent from the Lawrence City Filter (Old Filter).

18	6	1	99.7	99.2	99.4	-	-	1	21	49	33
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Effluent from the Lawrence City Filter (New Filter).

10	3	0	99.8	99.6	100.0	-	-	0	5	37	8
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Mixed Effluents as pumped to the Distributing Reservoir.

21	6	0	99.6	99.2	100.0	-	-	0	15	51	20
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Water from the Outlet of the Distributing Reservoir.

24	8	0	99.6	98.9	100.0	-	-	0	7	29	13
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Water from a Tap at Lawrence City Hall.

25	9	0	99.5	98.7	100.0	-	-	0	2	36	5
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Water from a Tap at the Lawrence Experiment Station.

17	4	0	99.7	99.4	100.0	-	-	0	2	19	4
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*Average Chemical Averages.**Merrimack River. — Intake of the Lawrence City Filters.*

[Parts in 100,000.]

Temperature (Degrees F.).	APPEARANCE.		AMMONIA.			Chlo- rine.	NITROGEN AS —		Oxygen con- sumed.	Iron.	Soap Hard- ness.
			Free.	ALBUMINOID.			Ni- trates.	Ni- trites.			
	Tur- bidity.	Color.		Total.	In So- lution.						
53	0.3	.44	.0123	.0176	.0141	.37	.016	.0004	.61	.0753	1.1

*Average Chemical Averages — Concluded.**Effluent from the Lawrence City Filter (Old Filter).*

[Parts in 100,000.]

Temperature (Degrees F.).	APPEARANCE.		AMMONIA.			Chlo- rine.	NITROGEN AS —		Oxygen con- sumed.	Iron.	Soap Hard- ness.
	Tur- bidity.	Color.	Free.	ALBUMINOID. Total.	In So- lution.		Ni- trates.	Ni- trites.			
53	0	.42	.0154	.0095	—	.45	.037	.0002	.40	.0190	1.1

Effluent from the Lawrence City Filter (New Filter).

53	0	.32	.0047	.0081	—	.38	.026	.0003	.40	.0330	1.1
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Water from the Outlet of the Distributing Reservoir.

53	0	.41	.0084	.0101	—	.46	.036	.0003	.39	.0870	1.1
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Water from a Tap at Lawrence City Hall.

53	0.1	.43	.0057	.0085	—	.46	.038	.0002	.38	.0780	1.1
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Water from a Tap at the Lawrence Experiment Station.

53	0.1	.38	.0039	.0080	—	.47	.038	.0001	.36	.0770	1.2
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*Average Solids.**Merrimack River. — Intake of the Lawrence City Filters.*

[Parts in 100,000.]

UNFILTERED.			FILTERED.			IN SUSPENSION.		
Total.	Loss on Ignition.	Fixed.	Total.	Loss on Ignition.	Fixed.	Total.	Loss on Ignition.	Fixed.
6.15	2.53	3.62	5.30	2.25	3.05	.85	.28	.57

Effluent from Lawrence City Filter (Old Filter).

6.10	2.20	3.90	—	—	—	—	—	—
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Effluent from Lawrence City Filter (New Filter).

5.26	1.97	3.29	—	—	—	—	—	—
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*Average Solids—Concluded.**Water from the Outlet of the Distributing Reservoir.*

[Parts in 100,000.]

UNFILTERED.			FILTERED.			IN SUSPENSION.		
Total.	Loss on Ignition.	Fixed.	Total.	Loss on Ignition.	Fixed.	Total.	Loss on Ignition.	Fixed.
6.08	2.36	3.72	—	—	—	—	—	—

Water from a Tap at Lawrence City Hall.

6.20	2.33	3.87	—	—	—	—	—	—
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Water from a Tap at the Lawrence Experiment Station.

5.87	2.15	3.72	—	—	—	—	—	—
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PURIFICATION AND TREATMENT OF SEWAGE.

Many tanks, filters and other apparatus were operated as usual in studies of the treatment and purification of sewage, these studies being of great importance not only to the Department but for the advance of sanitary information along these lines. Some of these experiments are most valuable, however, when the results of several or many years' investigations have accumulated and the longer most of them are continued the greater the reliance that can be placed on the results obtained, especially for basing replies to cities, towns, etc., in regard to such treatment or purification.

The sewage has been obtained as usual from the Osgood Street sewer of the city of Lawrence. It is pumped into a cylindrical settling tank and from this tank it flows to the filters and other apparatus. The quality of the three grades of sewage used at the Experiment Station is shown by the following average analyses of many samples collected during the year:—

*Average Analyses.**Regular Sewage.*

[Parts in 100,000.]

AMMONIA.			KJELDAHL NITROGEN.		Chlorine.	Oxygen consumed.	Bacteria per Cubic Centimeter.
Free.	ALBUMINOID.						
	Total.	In Solution.	Total.	In Solution.			
3.77	.87	.48	1.57	.92	9.1	6.32	2,210,000

Settled Sewage.

4.07	.65	.41	1.24	.83	7.5	4.47	1,850,000
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*Average Analyses — Concluded.**Sewage applied to Filters Nos. 1, 4 and 9A.*

[Parts in 100,000.]

AMMONIA.			KJELDAHL NITROGEN.		Chlorine.	Oxygen consumed.	Bacteria per Cubic Centimeter.
Free.	ALBUMINOID.						
	Total.	In Solution.	Total.	In Solution.			
3.03	.69	—	1.33	—	8.6	4.71	2,210,000

*Average Solids.**Regular Sewage.*

[Parts in 100,000.]

UNFILTERED.			FILTERED.			IN SUSPENSION.		
Total.	Loss on Ignition.	Fixed.	Total.	Loss on Ignition.	Fixed.	Total.	Loss on Ignition.	Fixed.
65.1	29.9	35.2	45.8	20.0	25.8	19.3	9.9	9.4

Settled Sewage.

48.4	20.2	28.2	37.4	14.0	23.4	11.0	6.2	4.8
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PURIFICATION OF SEWAGE BY AERATION.

The importance of studies of the activated sludge method of sewage disposal is recognized throughout the country and the results obtained at different places with sewage of different quality are widely quoted and compared. The city of Milwaukee, for example, has expended several hundred thousand dollars investigating this process. It is the newest method of sewage disposal and its great advantage lies in the fact that it allows the treatment of large volumes of sewage on limited areas. The effluent obtained from this treatment is not that which can be obtained from well operated sand or trickling filters but is of sufficient purity or stability to make the process of great value wherever the effluent can be passed into considerable volumes of sea, lake or river water.

Activated sludge Tank No. 485 at the Station was continued in operation throughout the year. A description of its construction, etc., has been given in previous reports. During the year sewage was passed through it at such a rate that theoretically it took six and one-half hours for this passage. The total air applied has amounted to 3.25 cubic feet per gallon of sewage. All the samples of effluent tested were stable. The sludge content of the tank was maintained at about 20 per cent of its capacity and surplus sludge equivalent to 790 pounds of dry sludge per million gallons treated was removed. This sludge has a nitrogen content of 4.69 per cent, a fat content of 5.2 per cent and is comparatively stable. Reckoning purification in percentage of nitrogen removed, as determined by albuminoid ammonia, the tank purified the sewage to the extent of 72 per cent. The matters in suspension in the sewage were reduced 90 per cent; the bacteria, 78 per cent. The average nitrates in the effluent were .14 parts in 100,000.

A second tank of this nature, known as No. 509, has been in operation for several years and contains layers of slate laid horizontally, held about two inches apart and equivalent in volume to about 4.3 per cent of the total capacity of the tank. This tank is not operated continuously as is No. 485 but on the fill and draw principle. Air is applied through perforated brass pipes at the bottom as is the case with No. 485 and the volume of air used is the same as with Tank No. 485. Ninety per cent of the samples of effluent from this tank tested during the year have been stable. The reduction of organic matter denoted by albuminoid ammonia determinations was 52 per cent, of matter in suspension 68 per cent and of bacteria 55 per cent. The sludge taken from this tank during the year has equalled 775 pounds per million gallons of sewage treated, has had a nitrogen content of 3.11 per cent and a fat content of 17.8 per cent, and has not been particularly stable.

HOUSEHOLD SEPTIC TANKS.

During recent years much has been said of the value of small septic tanks for the disposal of sewage from households, hotels, etc., and to prove to our own satisfaction the results that could be obtained in this way, two concrete air-tight tanks have been operated at the Lawrence Experiment Station of the Department for the past two and one-half years. One of these tanks is four feet long, 2 feet wide and 40 inches deep, with a sloping bottom and a capacity of 185 gallons. The sewage enters the tanks through a trapped inlet and discharges through a pipe reaching fifteen inches below the surface of the sewage in the tank. A baffle is placed one-third of the distance from the inlet to the outlet and reaches to within eight inches of the surface of the sewage and to within ten inches of the bottom of the tank. A trapped outlet is provided for the escape of gas and air is carefully excluded.

A second tank consists of two compartments, each practically of the same construction as the tank just described and has a capacity of 370 gallons. The first tank receives fresh household sewage and the second, Lawrence city sewage as pumped at the Experiment Station. Both are so operated that theoretically the sewage is held within each for two days, — a period much longer than generally possible at municipal works where large volumes of sewage must be handled. These tanks are large enough for use by small households.

The following results have been obtained: The effluent from each has generally been quite odorless although occasionally the effluent from the tank receiving Lawrence sewage has had a strong odor of hydrogen sulphide. The effluents have been fairly clear, quite free from colloidal matters containing only about 27 per cent of the suspended solids of the entering sewage, and that from the first tank receiving household sewage has been stable, that is, non-putrefactive 27 per cent of the time, as shown by our analytical work. From the second tank receiving Lawrence sewage, the effluent has been stable 21 per cent of the time. At the present time after more than two and one-half years' operation, 35 per cent of the first tank is filled with sludge and 27 per cent of the second tank. This sludge is of course largely water but is well compacted and contains about 6 per cent of solid matter. Judging from our observations from time to time the volume of sludge is increasing slowly but steadily in each tank. Analyses show that 66 per cent of the total amount of matters in suspension in the sewage entering the tanks has been destroyed; that is, undergone hydrolysis within them.

On the whole these tanks have given about the results expected of them and show that a great clarification of sewage by retention, sedimentation and destruction of the matters in suspension in sewage can be obtained in this manner. The effluents are not of as good a quality as claimed by many who have urged the installation of such tanks; neither is there a total destruction of sludge, the indications being that of course eventually the sludge accumulating in each of these tanks will have to be removed as has generally proved to be true with all septic tanks, if they are to continue in efficient operation. Such tanks undoubtedly have a place in household, factory or hotel sewage disposal and if properly constructed of adequate capacity, can be recommended for installation where connection with municipal sewers cannot be made.

OPERATION OF CONTACT AND TRICKLING FILTERS.

One contact and ten trickling filters were continued in operation. The contact filter has been in operation twenty-one years, one of the trickling filters twenty-three years and many of the others from seven to ten years. It is impossible to briefly summarize their operation and the meaning of the important results obtained so that they may be included in this brief report. Tables of average analyses are given, however.

*Average Analyses.**Effluent from Contact Filter No. 175.*

[Parts in 100,000.]

Quantity applied. Gallons per Acre Daily.	AMMONIA.			Kjeldahl Nitrogen.	Chlorine.	NITROGEN AS —		Oxygen consumed.	Bacteria per Cubic Centimeter.
	Free.	ALBUMINOID.				Nitrates.	Nitrites.		
		Total.	In Solution.						
316,000	1.28	.25	.18	.57	6.8	1.87	.0835	1.63	264,000

*Average Solids.**Effluent from Contact Filter No. 175.*

[Parts in 100,000.]

UNFILTERED.			FILTERED.			IN SUSPENSION.		
Total.	Loss on Ignition.	Fixed.	Total.	Loss on Ignition.	Fixed.	Total.	Loss on Ignition.	Fixed.
46.4	18.7	27.7	42.0	16.6	25.4	4.4	2.1	2.3

*Average Solids.**Effluents from Trickling Filters Nos. 135, 452, 453, 454, 455, 472, 473, 474, 475, 522 and Applied No. 522.*

[Parts in 100,000.]

FILTER NUMBER.	UNFILTERED.			FILTERED.			IN SUSPENSION.		
	Total.	Loss on Ignition.	Fixed.	Total.	Loss on Ignition.	Fixed.	Total.	Loss on Ignition.	Fixed.
135	54.9	24.3	30.6	45.5	19.4	26.1	9.4	4.9	4.5
452	59.4	25.8	33.6	42.4	16.2	26.2	17.0	9.6	7.4
453	56.8	24.1	32.7	44.4	18.8	25.6	12.4	5.3	7.1
454	50.7	21.3	29.4	38.5	15.5	23.0	12.2	5.8	6.4
455	50.3	21.1	29.2	41.9	17.1	24.8	8.4	4.0	4.4
472	48.3	18.3	30.0	37.6	12.7	24.9	10.7	5.6	5.1
473	47.4	18.4	29.0	38.6	13.0	25.6	8.8	5.4	3.4
474	49.6	18.7	30.9	38.9	12.8	26.1	10.7	5.9	4.8
475	48.9	18.3	30.6	40.1	14.4	25.7	8.8	3.9	4.9
522	40.1	13.8	26.3	36.8	12.6	24.2	3.3	1.2	2.1
A. 522	41.0	12.9	28.1	34.2	10.3	23.9	6.8	2.6	4.2

Average Analyses.

Effluents from Trickling Filters Nos. 135, 452, 453, 454, 455, 472, 473, 474, 475, 522 and Applied No. 522.

[Parts in 100,000.]

FILTER NUM- BER.	Quantity applied. Gallons per Acre Daily.	AMMONIA.			Kjeldahl Nitrogen.	Chlorine.	NITROGEN AS —		Oxygen consumed.	Bacteria per Cubic Centimeter.
		Free.	ALBUMINOID.				Nitrates.	Nitrites.		
			Total.	In Solution.						
135 . . .	1,370,000	2.27	.41	.23	.83	7.1	1.98	.0238	2.64	273,000
452 . . .	727,000	2.91	.59	.32	1.22	7.0	1.45	.0960	3.43	727,000
453 . . .	1,088,000	2.23	.43	.26	.95	7.1	1.85	.0655	2.78	301,000
454 . . .	1,532,000	2.41	.43	.28	.86	7.0	1.22	.0824	2.53	557,000
455 . . .	2,051,000	2.24	.44	.25	.89	7.1	1.53	.0345	2.42	459,000
472 . . .	727,000	2.91	.51	.30	1.09	7.0	.70	.0613	3.10	583,000
473 . . .	1,088,000	3.00	.52	.34	1.10	6.9	.57	.0488	3.21	442,000
474 . . .	1,532,000	2.55	.53	.31	1.05	7.0	.87	.0672	2.92	455,000
475 . . .	2,059,000	2.33	.44	.25	.92	7.1	1.39	.0560	2.56	310,000
522 . . .	5,637,000	1.93	.25	.17	.51	6.5	1.05	.0885	1.91	546,000
A. 522 . .	—	2.50	.37	.22	.71	6.6	.64	.0792	2.37	818,000

INTERMITTENT SAND FILTERS OPERATED WITH UNTREATED SEWAGE.

Filters Nos. 1, 4 and 9A.

Each of these three sand filters is 1/200 of an acre in area, and at the end of the year Filters Nos. 1 and 4 had been in operation nearly thirty-five years and Filter No. 9A, thirty-two years. They illustrate what can be done in sewage purification by intelligent operation of sand filters through long periods. Regular sewage without preliminary clarification has always been applied to them and for many years it has been the practice to apply only as much sewage to each filter as can be purified without materially increasing the amount of organic matter stored within the filter.

For many years the surfaces of Filters Nos. 1 and 9A have been trenched and ridged late in the fall and leveled in the spring. The surface of Filter No. 4 is arranged in circular trenches, fourteen inches wide, which are filled to a depth of twelve inches with sand of an effective size of .48 millimeter. Sewage is applied to these trenches, grass being permitted to grow on the ridges. In winter board coverings are put over the trenches on all three filters, which aids materially in keeping the surface of the trenches from freezing. They were put on Nov. 18, 1921, and removed on April 10, 1922. The surface of the filters was dug over to a depth of ten to twelve inches twice and raked thirteen times.

*Average Analyses.**Effluent from Filter No. 1.*

[Parts in 100,000.]

TEMPERATURE (DEGREES F.).		AMMONIA.		Chlo- rine.	NITROGEN AS —		Oxygen con- sumed.	Alka- linity.	Bacteria per Cubic Cen- timeter.
Ap- plied.	Efflu- ent.	Free.	Albumi- noid.		Ni- trates.	Ni- trites.			
59	50	.5610	.0625	7.8	2.77	.0040	.61	—1.5	18,000

Effluent from Filter No. 4.

59	51	.0362	.0196	7.2	2.05	.0121	.35	—1.8	320
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Effluent from Filter No. 9A.

59	52	.3071	.0378	7.0	2.20	.0006	.56	0.2	4,000
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REPORT OF DIVISION OF FOOD AND DRUGS.

During the year 1922, the Division of Food and Drugs of the Massachusetts Department of Public Health has been engaged in the usual routine work of the enforcement of the milk, food, drug, cold storage, slaughtering, bakery, soft drink, and mattress laws, in the examination of samples submitted by police authorities and also in the manufacture of arsphenamine.

The samples examined this year are the largest on record, exceeding those examined last year by 1,641. The samples examined consisted of 7,215 milk samples, 2,075 food samples, 317 drug samples, 5,766 liquor samples, 208 samples of narcotics and alleged poisons from the police departments, and 14 samples of coal for the Department of Correction and for the Division of Sanatoria of this Department.

There were 277 prosecutions for violation of the law, 5 less than were prosecuted during 1921. Of these cases, 251 resulted in conviction, 18 were found not guilty, and 8 were dismissed for want of prosecution.

The following table gives a summary of the court cases:—

	Conviction.	Discharged.	Dismissed.
Milk:			
Low standard	4	1	—
Cream removed	16	1	2
Watered	37	—	1
No Name or License Number on Wagon	1	—	—
Adulterated or Misbranded Foods:			
Ice Cream	—	1	—
Maple Sugar	1	—	—
Olive Oil	2	—	—
Sausage	24	1	—
Vinegar	6	—	—
Eggs:			
Decomposed	10	—	—
Misbranded	8	1	—
Cold Storage not properly labeled	77	2	—
Decomposed Food	1	—	—
Adulterated Drugs	9	6	—
Cold Storage Violations	5	—	—
Slaughtering Law Violations	21	4	2
False Advertising of Foods	7	—	1
Mattress Law Violations	22	1	2
Totals	251	18	8
	277		

The following table gives a summary of the confiscations during the past year:—

ARTICLE.	Number of Confiscations.	Weight (Pounds).
Poultry	8	1,636
Meat	24	15,322
Fish	5	15,613
Fruit	2	38,400
		448 ¹
	39	70,971
		448 ¹

¹ Crates.

MILK.

The inspectors collected 7,104 samples, of which 1,994 were below the legal standard. This is a higher percentage of low standard milk than actually exists upon the market, owing to the many samples of milk taken from suspicious sources. The number of these samples is in the neighborhood of 20% of the total samples collected. Whenever adulterated milk is collected from a milk dealer who purchases his supply from dairies located in this state, it is the custom to investigate these dairies in order to ascertain who is doing the adulteration. On these investigational trips it is necessary to take samples from a large number of cans from the supply of one person.

Of the adulterated samples collected, 217 were watered and 132 were samples from which a portion of the cream had been removed and which were sold as whole milk. The average quality of the milk sold throughout the state, as shown by these figures, is somewhat higher than has been obtained during the previous five years. In computing these figures, the samples shown upon examination to be actually adulterated are subtracted from the total samples examined, therefore, only those samples are used in making this average which cannot be declared adulterated. It should be understood, however, that a certain number of samples adulterated to an extent so slight that they cannot be detected are included in these figures, and the average market milk is therefore somewhat better than this computation shows. The figures are as follows:—

	Per Cent.
Total solids	12.62
Fat	3.84
Solids not fat	8.75

This department has a most complete set of statistics upon the composition of market milk, and these figures are quoted throughout the country. The summary of these figures will be found in table 2.

During the year considerable work has been done upon the cryoscopic examination of milk, and the results of the work show that the method is satisfactory for the detection of watered milk, in the hands of a person properly trained in physical chemistry. The difference between the freezing point of water and the freezing point of milk is about 55/100 of 1 degree centigrade. The thermometer capable of reading temperatures so accurately as this method requires is unusually sensitive; it must be frequently calibrated; and the person manipulating the test must understand all the sources of error which are liable to arise under such circumstances. The method would be untrustworthy in the hands of a person not trained in accurate physical measurements. The work done upon this method was reported at the last meeting of the Association of Official Agricultural Chemists, at which meeting the method was adopted as an official method of the Association.

FOODS OTHER THAN MILK.

Of the 2,075 samples of food examined, 491 were declared to be adulterated. The total samples examined are somewhat less than those examined last year, due to the fact that there were comparatively few extensions requested for storage of butter during the present year. Only such samples as were found to be adulterated will be discussed. The summary of the samples examined will be found in table 3.

A number of samples of cider were found to contain sodium benzoate and were sold in violation of the regulations without the necessary label stating the presence and quantity of preservative added. Of the 297 samples of eggs examined, 195 were found to be sold in violation of the law. The eggs collected and examined during the present year were considerably superior to those examined during former years, notwithstanding the large number of violations. These violations are divided into three classes: first, the sale of old but edible eggs as fresh eggs, namely, misbranding; second, the sale of cold storage eggs as fresh eggs; and third, the sale of decomposed eggs. Of all the samples examined during the year, only six showed the presence of decomposed eggs. The sale of cold storage eggs as fresh

eggs or without the necessary sign is fairly common. The average cold storage egg on the market during October, November, and December is an unusually fine egg and compares very favorably with the fresh eggs on the market in August and September. It is a well known fact that hens cease laying eggs in the fall of the year and that the egg production during the winter months is not particularly heavy. This deficiency in the market supply of eggs is furnished from the cold storage warehouses and by the sale of September and October laid eggs which have been held at temperatures of 45° or above, not in cold storage warehouses. Although these eggs are not cold storage eggs, yet they cannot and should not be sold as fresh eggs.

At a hearing given to the proprietor of one of the stores of a chain store system, relative to the sale of cold storage eggs without properly marking the container, the president of the Company stated that the Company had sold no cold storage eggs during the season and had taken no cold storage eggs out of the warehouse. He was then given a list of 2,000 cases which he had taken out of one of the Boston warehouses. He then acknowledged that that was a fact, but stated that the eggs had been in there for only thirty days, and, therefore, were not cold storage eggs. In fact, the eggs were kept there for thirty-one days, but in accordance with the provisions of the law they would have been cold storage eggs if kept there only twenty-nine days. These eggs, which had therefore been kept in storage for a month in this state, and possibly had been stored elsewhere, were being sold to the public as fresh eggs. Needless to say, this corporation was prosecuted.

The examination of these eggs is comparatively simple. When an egg is viewed by transmitted light, an air space is visible at one end of the shell. The size of this air space indicates the age of the egg. As the egg gets older, water evaporates from the contents of the egg and passes through the pores of the shell, thereby enlarging this air space. After this examination is completed some of the eggs are broken out, the contents are well beaten, and the ammonia is determined upon the mixture. Ammonia is one of the decomposition products of eggs, and from the ammonia content an index is obtained of the stage of decomposition of the egg. If the size of the air space indicates an old egg, and the ammonia content indicates little or no decomposition, the egg has been kept for a long time under efficient refrigeration and is probably a cold storage egg. If the air space is large and the ammonia content high, the egg is an old egg which has not been efficiently refrigerated, and if the air cell is small and the ammonia content low, the egg is a fresh egg.

The samples of honey reported adulterated were found to contain artificial invert sugar. They were all out of state samples, and the evidence was passed to the U. S. Department of Agriculture for investigation.

The number of sausages examined was a great deal in excess of those examined in 1921. An unusual number of adulterated samples were detected, but the percentage of adulteration was considerably lower than in 1921. The adulteration of sausages consists of the addition of starch and the addition of color. Starch when cooked with water will absorb about four times its weight of water. The statute permits the use of 2% of cereal or any product of vegetable flour, which naturally permits the addition of from 6% to 8% of water over and above what would be taken up by the meat. The addition of 1% of starch in excess of the statutory limit will therefore give the sausage manufacturer an opportunity of increasing the weight of the sausages to an extent of 5%, and the addition of 2% of starch will therefore permit the addition of 10% of weight to the sausage at practically no additional cost to the manufacturer. During the summer months this form of adulteration practically ceases, but during the months of December, January, February, and March it is very extensive. This addition of water by the use of starch is confined to cooked sausages like frankforts and bologna. The use of starch in pork sausages is for an entirely different purpose. The high grade sausages, including pork sausages, are made without any cereal filler. The low-grade sausages contain a surplus amount of fat pork, and in order to prevent the sausage from disappearing when cooked, corn meal is added to hold back the fat which otherwise would melt out during the frying process. The use of color is prohibited by statute, but a colored sausage has certain advantages over an uncolored sausage.

In the first place it is liable to sell more readily because the article appears like a well smoked article, but if a frankfort sausage is made without color it is necessary to smoke it for a considerable time in order to darken the skin, and during this smoking process the sausage dries out to a considerable extent. Therefore, the principal advantage of coloring instead of smoking is to pass more water on to the consumer when he buys the sausage.

The 15 samples of molasses reported as adulterated were interstate shipments of molasses in cans, and contained more ash than is permitted by the U. S. Standards, which by statute have been adopted by this department. This has been referred to the Department of Agriculture, but no action has been taken as the result of these complaints.

The low percentage of adulteration of olive oil is remarkable, considering conditions found during 1921. During that year there were 228 samples collected, of which 86 were adulterated. During the present year only one sample was found to be adulterated. This lack of adulteration is due in some measure to the efficiency of the inspectors of this department, who prosecuted a large number of wholesale dealers in olive oil last year, but it is also due in part to the fact that the price of olive oil has decreased considerably, and there is not the monetary incentive to adulterate that there was during the season of high prices.

The sale of soaked scallops is beginning to increase, due to shipments from other states. A complaint was received this fall from the scallop dealers of the cape district that they could not compete with the scallop shipments from New York. A number of samples were taken and found to be adulterated. The hearings prescribed by statute were given to the retail dealers handling these scallops. An attempt was then made to prosecute the agents of the New York firms shipping these scallops into Massachusetts. This attempt failed on account of the peculiar construction of the law passed in 1917. The matter was referred to the U. S. Department of Agriculture, which department took the matter up with the New York Health Department. The dealers handling these scallops were informed that they would be held criminally responsible for any future scallops of that sort which they sold, since which time the scallops coming in from New York have been shipped with only the natural water which belonged there. Four gallons of dry scallops placed in a seven gallon pail and shipped with the addition of three gallons of water, will arrive at their destination containing apparently seven gallons of scallops. A person familiar with the appearance of a soaked and an unsoaked scallop can readily distinguish them.

There were 94 samples of soft drinks collected and examined, of which 4 were found to be misbranded. The misbranding was not confined to any of the ingredients of the soft drinks, but consisted of the absence of the name of the manufacturer as required by the regulations.

There were 323 samples of vinegar examined, of which 86 were adulterated. This adulteration consisted largely of failure to supply an article containing the amount of acetic acid required by statute. A complaint was received relative to the sale of apple waste vinegar, otherwise known as evaporated apple vinegar. This material is made from the refuse of apple evaporators or canneries. The skins and cores are evaporated and are shipped to the vinegar factories, are soaked in water, and the vinegar is made from the solution. This material contains considerable sulphur dioxide and some manufacturers remove this by the use of barium carbonate, the resulting barium sulphate being insoluble in water. Although barium sulphate is about as insoluble an article as exists, yet it will dissolve to a very slight extent in water, and if one liter (about one quart) of vinegar so prepared is used for analysis it is possible to obtain a test for barium. If the vinegar is made without the addition of barium carbonate, it will show a large amount of sulphur. The statute prohibits the sale under the name of cider vinegar of apple vinegar or any vinegar not the exclusive product of the alcoholic and subsequent acetous fermentation of the pure juice of fresh apples. In response to the complaints received, prosecutions will be begun shortly against persons handling this apple waste vinegar which is sold under the name of "evaporated apple vinegar" or some similar name, for using the term "apple vinegar" in violation of the statute just referred to.

DRUGS.

The adulteration of drugs has been reduced to a minimum. The larger quantity of drugs sold by the retail drug stores is put up by manufacturing druggists, and therefore is more liable to be in accordance with the requirements of the pharmacopœia than that put up by the retail pharmacist. No unusual form of drug adulteration was detected.

A number of samples of sweet spirit of nitre were found to be deficient in strength. This drug is capable of deterioration, but if kept under ideal conditions will last for a year or more without change. Samples have been kept for that length of time in the ice chest in this division and have been tested from time to time and have shown no deterioration. If samples are kept in an amber colored bottle, even in a place varying in temperature between 69° and 72°, the deterioration will amount to only 10% or 12% in a month. One sample was placed in a white bottle in the sunlight, and it deteriorated only 25% in thirty-three days. Under these conditions, it should be expected that the pharmacist should sell sweet spirit of nitre at least 70% of the strength required. Nevertheless, a large number of pharmacists will take no precautions to protect this drug from deterioration.

The complaints received from the public as a rule are unsatisfactory, and investigation of these complaints generally lead to a finding that the complaint is absolutely without foundation. One person, however, complained about a sample of lime water purchased in a drug store, and he brought in the sample which was placed in a bottle bearing the label "Fluid Extract of Nux Vomica" bearing in addition a lime water label. The lime water was dark colored and the man did not care to use it. Examination of the sample showed the presence of strychnine. An inspector of this department went to the drug store and obtained another sample of lime water, which was deficient in strength. The druggist recognized the bottle at the hearing, acknowledged that the sale was made in his presence, and paid a fine of sixty dollars (\$60.00).

The magnesium citrate solution prescribed by the pharmacopœia has a tendency to deposit a precipitate of a basic magnesium salt after standing for awhile. The Italian trade uses magnesium solution quite freely, but according to information received from the druggist, are not satisfied with the U. S. P. preparation. What they desire is a magnesium sulphate solution sold under the name of magnesium citrate. Complaints have been received from physicians prescribing magnesium citrate that druggists have substituted the sulphate solution, which has been of no great benefit to the patient.

A number of proprietary magnesium solutions are on the market, sold under proprietary names, and their sale as such is not in violation of the law. Inspectors of this department obtained sales from certain drug stores of these proprietaries when citrate of magnesium solution was called for. The druggists at the hearing all stated that they understood when purchasing this article that it could be sold when citrate of magnesium was called for. Two prosecutions were brought against two persons for these sales to the retail druggist. One case resulted in a conviction and an appeal to the superior court. The other case resulted in an acquittal, due to the fact that the retail druggist came into court and said that they knew the article was not a U. S. P. preparation, and was not intended to be sold when magnesium citrate was called for.

LIQUOR.

The liquor work has been notable in increase of samples submitted by the police authorities, increase in the number of cities and towns submitting such samples, and increase in the percentage of distilled liquors. This liquor analytical work was begun by the State Board of Health, the direct predecessor of this Department, in 1902, and from that time until June 30, 1919, about 2,000 samples were examined. In the fiscal year ending November 30, 1919, the Department examined 1,411 samples. In 1920 there were examined 1,429 such samples; in 1921 there were examined 3,831 such samples; and in 1922 there were 5,766 such samples examined.

These were submitted by 139 cities and towns and by the Department of Public Safety.

In 1920 about 10 towns per month submitted samples. This number has been increasing at about the same rate as the samples, and is now about 45 per month. Fortunately, we know that there is a top limit to this figure; it cannot exceed 355 until the Legislature has increased the number of towns. But the top limit of the samples is unknown, and depends upon three factors: first, the number of violations; second, the efficiency of the police departments; and third, the number of samples submitted from each raid. This increase in sample numbers has not been arithmetic, but geometric.

The present indications are that the top limit of samples has been reached. The average number of samples per month during the year was 480; during the first six months it was 466; during the last six months it was 494; and during the last nine months it was 502. Nine cities submitted each more than 1% of the total samples, — 4,425 in all or 76.7% of the total samples. These figures for these cities for the past three years are given in the following table:—

	1922.		1921.		1920.	
	Samples submitted.	Per Cent of Total Samples.	Samples submitted.	Per Cent of Total Samples.	Samples submitted.	Per Cent of Total Samples.
Boston	2,654	46.1	1,823	47.2	668	47.2
Lowell	429	7.5	83	2.2	17	1.2
Cambridge	406	7.1	336	8.8	220	15.6
Lawrence	229	4.0	122	3.2	41	2.9
Somerville	205	3.6	34	0.9	10	1.7
Fall River	196	3.4	155	4.0	32	0.7
Springfield	75	1.3	134	3.5	—	—
Taunton	73	1.3	25	0.6	2	0.1
	4,425	76.7	2,712	70.8	990	70.0

Thirty-five towns submitting no samples in 1920 or 1921 submitted a total of 134 samples in 1922, but 28 localities submitting samples in 1920 and 1921 submitted no samples in 1922, the total samples being 37 in 1920 from 6 towns and 108 in 1921 from 27 towns. The bulk of the increase in samples, however, has come from Boston, Cambridge, Fall River, Lawrence, Lowell and Somerville. These localities submitted 1,105 samples in 1920; 2,637 in 1921; and 4,277 in 1922. Seventeen cities and towns submitting from 14 to 75 samples each in 1922, submitted in all 136 samples in 1920; 529 in 1921; and 699 in 1922.

The character, as well as the number of samples, has varied extensively. In 1919 most of the samples were beers, with a few samples of distilled liquor and Jamaica ginger extract. In 1920 the beer samples were but few; the distilled liquors, cider, wines and ginger extracts showed considerable increase. In 1921 the distilled liquors increased and the extracts decreased, and in 1922, the tendencies have been in similar directions.

The following table gives the percentage classification of samples submitted in 1920, 1921, and 1922:—

	1920.	1921.	1922.
Beer	77.3	9.4	8.4
Wine	3.0	3.7	1.2
Cider	2.9	6.7	6.1
Distilled Liquors	3.0	61.4	74.9
Flavoring Extracts	8.5	5.3	1.0
Alcohol	1.5	5.8	4.6
Miscellaneous	3.8	7.7	3.8
Totals	100.0	100.0	100.0

The "miscellaneous" classification occasionally excites comment on the grounds, "Why a 'miscellaneous' column when there is such a satisfactory list from which to choose?" These miscellaneous samples, necessary as evidence in the trial of liquor cases, consist of such articles as exhausted malt, mash, coloring matter, malt extract, non-alcoholic imitations of liquors, alcoholic and non-alcoholic proprietaries, sink drainage (mostly alcoholic), a sample of boiled dinner into which, during a raid, a full bottle of whiskey was thrown, resulting in an explosion and a conviction; and in one instance a sample of alcoholic sand obtained in a raid, also resulting in a conviction.

Because of the increase in liquor work, an additional assistant was appointed during the present fiscal year, but in all probability there will be no necessity for any increase in the analytical force because of liquor work for some time.

MATTRESSES.

A mattress law was passed in this state in 1915, at the request of the trade, and this law was amended in 1919 relative to the sale of second-hand material. This law is now found in General Laws, chapter 94, sections 270 to 277, inclusive. This Department is required by this law, whenever there is reason to believe that a violation exists, to make an investigation, and if upon investigation it has been found that any of the material has been used in or about a hospital or about the person of any one having an infectious or contagious disease, the Department may destroy the mattress.

A number of requests were received for the department to proceed against mattress manufacturers for violations of other provisions of the act. In view of the fact that the activity of the department was apparently limited by the wording of the statute, the matter was referred to the Attorney General who reported that the department could with propriety proceed against persons violating other provisions of the statute than those which this department was directly authorized to proceed against. In accordance with this decision, an investigation of the mattress factories was made and practically all of them were visited. The principal violation detected was labeling the mattress as prescribed by statute, but either neglecting to state on the label what was in the mattress or else stating on the label something which was not in the mattress and leaving out the names of articles which were in the mattress. In all, 25 cases were prosecuted, resulting in one finding of not guilty, 2 cases dismissed for want of prosecution, and 22 convictions. The cases dismissed for want of prosecution were brought against individuals who told the inspector that they owned the business. After the cases were set it was found that these mattress factories were in reality corporations and the cases were therefore dismissed and new cases entered against the corporation.

The mattress law in its present condition is very unsatisfactory. It is technically inferior in many instances. It is easily evaded; the department is handicapped by insufficient authority; and the duties of the department are not defined as broadly as they should be.

PROSECUTIONS.

An interesting case of false advertising was tried in the Ipswich Court. A manufacturer of ice cream called at this office for the records of the analyses of ice cream manufactured by all the dealers in the town where his factory was located. This was refused. During the course of conversation this person produced an advertisement from this Ipswich ice cream dealer, stating, "Our ice cream was examined on May 5, 1922, by the State Board of Health and was placed at the head of the list." The person putting out the advertisement was convicted and fined.

Eleven cases were prosecuted for the sale of decomposed food. Ten of these related to eggs and one to the sale of decomposed pork chops.

The violations of the cold storage law, except that relating to the sale of cold storage eggs, were very few. Two cases were put in court for holding goods in cold storage for longer than twelve months without the consent of this department,

and two cases were put in court for retailing cold storage eggs without the necessary signs prescribed by statute. All of these cases resulted in conviction.

There were 27 prosecutions for violating the slaughtering laws. Twenty-one resulted in conviction, 2 were dismissed, and 4 were pronounced not guilty. These violations were for illegal use of the stamp; for slaughtering in the absence of the inspector; for the sale or offering for sale of unstamped meat; for the sale of veal weighing less than forty pounds; for slaughtering without a license; and for violations of the regulations of the department.

COLD STORAGE.

The amounts of goods on hand in storage were on the whole considerably lower than those previously reported and less than the average of the two preceding years. The indications are that the holdings of food in storage have practically reached a minimum. The warehouses have been making monthly reports of holdings of articles of food in storage, since August, 1920. Prior to that time the reports covered only amounts placed in storage during the month preceding that in which the report was made. These figures are compiled each month and are circulated to the citizens through the various newspapers of the state.

The number of extensions of time granted on goods in storage during the year have been relatively few and the total amount of such goods is considerably below that reported last year. Extensions were granted on 20,780 pounds of broken-out eggs. This represented shipments of Chinese eggs for use by bakers, with which article the country is somewhat overstocked.

An unusual condition was found in relation to halibut. This fish is handled largely by a corporation doing business on the Pacific coast, and an unusual quantity of fresh halibut was put on the market in 1921 during the season when there is generally a scarcity of such fish and the production of halibut during the season when storage halibut is consumed was also excessive. Extensions were granted on 495,401 pounds. A careful scrutiny of the storage reports showed that the owners of this fish made every effort to remove the fish from storage during the season when fresh fish was on the market and they succeeded in cutting down the holdings of this fish much more than was originally anticipated when the extensions were first discussed.

Each year brings its own problems regarding storage extensions. Last year it was pork and butter. In 1920 it was pork and fish. The statistics of cold storage extensions and holdings are given in tables.

SLAUGHTERING INSPECTION.

During the year a change has been made in the character of reports submitted by the local inspectors of slaughtering to this department. These were changed from quarterly reports to monthly reports, thereby giving a better opportunity of estimating the efficiency of the local inspectors.

Some of the local inspectors are being paid either directly by the butchers or indirectly by assessing a tax upon the butcher for the inspections. The statutes provide that a license may be granted to slaughter neat cattle, sheep, or swine on the payment of a certain sum of money. The statutes also provide that the city or town shall furnish an inspector and shall pay the inspector a reasonable compensation. This question has been referred to the Attorney General for an inquiry as to the duties of this department relative to those localities where the butcher is required to pay an additional tax for the services of the inspector. The payment of such a tax actually makes an inspector the servant of the butcher, which is not contemplated by the statute, and which should not be.

Many of the local inspectors are distinctly antagonistic to the department and endeavor to shield the butchers in every way possible when a violation of the law has been detected. This is not the general condition throughout the state, fortunately.

INSPECTION OF BAKERIES.

The regulations made by this department require local boards of health to inspect each bakery engaged in the manufacture of bread or other bakery products at least twice during each year, and to make a report to this department on a form furnished the department, of the number of inspections, and a summary of the defects found, together with the number of warnings, hearings, etc., given by the board. A number of localities operating bakeries have failed to file any report of work done during the year. Seventy-five localities report 3,804 inspections made. There were 932 verbal warnings given, 594 written warnings, 37 hearings, 24 bakeries closed, and 6 medical examinations were made. The number of hearings and written warnings were given by comparatively few boards of health.

It is not unusual for a board of health to report inspections of all bakeries in town and no defects detected. Upon a subsequent visit by an inspector of this department, there would be found only a few bakeries which were not defective under the law. One city reported 60 inspections and no defects. Shortly after this report was received, one of the inspectors of this department visited 81 bakeries in that town and found 28 with defective floors and walls; 26 with defective ceilings; 3 with defective storage facilities; 16 with apparatus not properly constructed and maintained; 12 with stock not properly stored, 38 with products not properly protected; 11 with an abundance of flies; 24 with improper flour storage; 8 with the use of tobacco in the bakery; 20 without any garbage can; 27 toilets unsatisfactory or in violation of the law; and in 21 instances animals kept in the bakery.

It is difficult at times to get adequate assistance from a local board to clean up the defects pointed out by the department, but after one or two visits the board generally cleans up. Notwithstanding the fact that the bakeries of this state are not all in an ideal condition, yet the general sanitary condition of these bakeries is vastly superior to what it was in 1920 when the law first went into effect.

CERTIFIED MILK.

Certified milk is milk produced under the supervision of a Medical Milk Commission, a corporation consisting of five or more physicians. The Commission serves without pay and enters into contracts with dairymen for the production of milk under the supervision of the corporation, provided that the conditions imposed for the production of certified milk shall not fall below the standard for purity and quality of such milk as fixed by the American Association of Medical Milk Commissions.

This department is empowered to investigate at any time the workings of any such corporation. By reason of a complaint received relative to the death of a child from tubercular peritonitis, the child said to have been fed exclusively upon milk from a certified dairy, an investigation was made by this department, which investigation indicated that the supervision of certified milk was far from satisfactory. These herds are required every six months to be tested by the tuberculin test and all reactors removed. No cows are permitted to enter the herd between these tests, except those which have been tested by the tuberculin test and found not to react. Under these conditions, one would expect that after a period of time tuberculosis would practically disappear from these herds. An investigation of the records of these herds shows that this is not the case, and in many instances the presence of tuberculosis in the herds increased materially as time went on. It was found, among other things, that the reacting cattle were sold to dairies not producing certified milk, and in most instances no attempt was made to see that the reactors were slaughtered. The figures for one herd are very significant.

In 1916, 107 cattle were inspected; 9 were reactors and 2 were suspicious.

In 1917, 120 cattle were inspected; 8 were reactors and 3 were suspicious.

In 1920, 116 cattle were inspected; 16 were reactors.

In 1921, 157 cattle were inspected; 14 were reactors.

Again in 1921 (6 months later), 210 cattle were inspected; 17 were reactors.

One certified milk farm was in especially poor condition. The dairy was certified in January, 1921, following a tuberculin test made of 48 cows in November, 1920. 12 reactors were removed. The tests due in June, 1921, did not take place until December, 13 months subsequent to the initial test, in direct violation of the certified milk standards. Between the first and second tests some cows were brought into the herd and were not tested in 1921. Only 24 of these were tested in December, 1921, and no reactors were reported. The dairy was inspected on March 25, 1922, by an inspector of this department. The herd consisted of 32 cows not all of which were milking. One cow calved on March 31 in her regular stanchion in the tie-up. Another cow showed a diseased udder. Two cows showed skin lesions. The cows were unclean. Sawdust instead of shavings was used for bedding. The stable was badly in need of whitewashing. Milk was poured in the corner of the tie-up near open, unclean rafters, and from conversation with the owner and the foreman it was learned that no physical examination was made of the employees.

These conditions are not peculiar to Massachusetts. They have been found elsewhere and the State of Minnesota has actually taken over the certification of milk. The State of New Jersey found similar conditions a few years ago, and the State Health Department now exercises considerable supervision over the production of certified milk.

While it may not be advisable at present for this State to take over the certification of milk and to abolish the Medical Milk Commission, yet it is advisable to amend the law by making the Commissioner of Public Health of this State a member of each Medical Milk Commission and of the board of directors thereof. Under such circumstances there would result a material improvement in certified milk.

ARSPHENAMINE.

The arsphenamine production has exceeded that of any other year since the work began. The distribution was 39,339 doses computed as 0.6 gram per dose. The estimate for the fiscal year 1922 was 50,000 doses. The amount distributed during 1921 was 37,117 doses.

The Division had practically reached the maximum production with the materials at hand. In anticipation of an increased production next year, there has been purchased, and, to some extent, installed, additional apparatus for the production of arsphenamine and the various intermediates, upon a larger scale than that permitted by the apparatus in use. It will, therefore, be possible to materially increase the production of arsphenamine with no additional cost for labor, except possibly additional cost for labor in bottling the drug.

There has been a material increase in the number of ampoules containing multiple doses. These have been distributed to the clinics, where a relatively large volume of the solution is made up and administered to syphilis patients. The drug is distributed in ampoules containing 0.4 gram, 0.6 gram, 1.8 grams and 3.0 grams. During the five months, March to July, inclusive, 1922, the average weight of arsphenamine per ampoule was 1.24 grams. Inasmuch as the cost of bottling is without doubt the highest cost per unit, the distribution of ampoules containing multiple doses materially reduces the cost of production.

A new organic arsenical known as sulpharsphenamine has been recently developed by Voeghlin and Johnson of the U. S. Public Health Service. This is much more easily prepared than Neoarsphenamine, and while its therapeutic properties cannot be determined until after courses of treatment lasting over a number of years, it is possible that this article may be of advantage in the treatment of syphilis. One batch of this article has been made, and will be tested and tried out during the next fiscal year.

TABLE NO. 1. — *List of Prosecutions.*
For Sale of Milk not of Good Standard Quality.

NAME.	Address.	Court.	Date.	Result.
Connos, Christi . . .	Springfield . . .	Springfield . . .	Oct. 25, 1922	Conviction.
Couchiaftis, James . . .	Springfield . . .	Springfield . . .	Oct. 10, 1922	Conviction.
Hazieperoa, Lisoia . . .	Springfield . . .	Springfield . . .	Oct. 10, 1922	Conviction.
Hood & Sons, H. P. . .	Salem . . .	Salem . . .	Oct. 26, 1922	Discharged.
Megos, John . . .	Springfield . . .	Springfield . . .	Oct. 10, 1922	Conviction.

For Sale of Milk from which a Portion of the Cream had been removed.

Connolly, Bernard J. . .	Taunton . . .	Taunton . . .	June 2, 1922	Conviction. ¹
Darby, William O. . .	Tewksbury . . .	Lowell . . .	May 17, 1922	Conviction.
Dow, Herbert A. . .	Salisbury . . .	Newburyport . . .	Aug. 3, 1922	Conviction.
Duart, Antone F. . .	Oak Bluffs . . .	Oak Bluffs . . .	Aug. 23, 1922	Conviction. ²
Findeisen's Farms, Inc. . .	Methuen . . .	Lawrence . . .	Mar. 20, 1922	Conviction.
Hodgkins, Emmett . . .	Lee . . .	Lee . . .	Oct. 10, 1922	Dismissed.
Hood & Sons, H. P. . .	Watertown . . .	Waltham . . .	Sept. 6, 1922	Conviction.
Kalp, John . . .	Dracont . . .	Lawrence . . .	July 25, 1922	Dismissed.
Kalp, John . . .	Dracont . . .	Lawrence . . .	July 25, 1922	Conviction. ²
Kennedy, John . . .	Whately . . .	Greenfield . . .	June 9, 1922	Conviction.
King, George W. . .	North Brookfield . . .	East Brookfield . . .	Sept. 29, 1922	Conviction.
Madison, Napoleon B. . .	Gay Head . . .	Oak Bluffs . . .	Aug. 23, 1922	Conviction. ²
Maka, Oscar . . .	Ashburnham . . .	Fitchburg . . .	July 13, 1922	Conviction.
Olson, Neil . . .	Braintree . . .	Quincy . . .	Nov. 6, 1922	Conviction.
Rubin, Samuel W. . .	Malden . . .	Malden . . .	July 26, 1922	Conviction.
Sharameta, Charles . . .	North Brookfield . . .	East Brookfield . . .	Sept. 29, 1922	Conviction.
Till, Mathias . . .	Adams . . .	Adams . . .	June 30, 1922	Conviction.
True, Henry O. . .	Salisbury . . .	Newburyport . . .	Aug. 3, 1922	Conviction.
Zaskey, Myron . . .	Hadley . . .	Northampton . . .	July 28, 1922	Discharged.

For Sale of Milk containing Added Water.

Bailey, John . . .	Dracont . . .	Lawrence . . .	Aug. 7, 1922	Conviction.
Bennevids, Antone . . .	Somerset . . .	Fall River . . .	Feb. 7, 1922	Conviction.
Bernard, Mary . . .	Oak Bluffs . . .	Oak Bluffs . . .	Aug. 23, 1922	Conviction. ²
Borges, Manuel . . .	Westport . . .	Fall River . . .	Sept. 1, 1922	Conviction.
Chamberlain, Everett . . .	Needham . . .	Dedham . . .	Nov. 29, 1922	Conviction.
Cheney, Manley B. . .	Lee . . .	Lee . . .	Oct. 10, 1922	Dismissed.
Dobra, Walter C. . .	North Attleborough . . .	Attleboro . . .	Sept. 18, 1922	Conviction.
Favreau, Leon F. . .	Southbridge . . .	Southbridge . . .	Dec. 23, 1921	Conviction.
Gay, Stanley . . .	Chicopee . . .	Chicopee . . .	Nov. 10, 1922	Conviction.
Glowacki, Joseph . . .	Andover . . .	Lawrence . . .	July 25, 1922	Conviction.
Glowacki, Joseph . . .	Andover . . .	Lawrence . . .	July 25, 1922	Conviction. ³
Jerome, Fred W. . .	South Hadley . . .	Northampton . . .	May 12, 1922	Conviction.
Keenan, John W. . .	Waltham . . .	Waltham . . .	Sept. 19, 1922	Conviction.
Kennedy, Thomas H. . .	East Pepperell . . .	Ayer . . .	Apr. 27, 1922	Conviction.
Kocincki, Stanislaw . . .	Ipswich . . .	Ipswich . . .	May 2, 1922	Conviction.
Kuragian, Samuel . . .	Clinton . . .	Clinton . . .	Feb. 17, 1922	Conviction.
Lewis, John . . .	Westport . . .	Fall River . . .	Sept. 1, 1922	Conviction.
Lewis, Thomas . . .	Oak Bluffs . . .	Oak Bluffs . . .	Aug. 23, 1922	Conviction. ²
Maquin, Joseph . . .	North Westport . . .	Fall River . . .	July 6, 1922	Conviction.
McHugh, Owen . . .	Harvard . . .	Clinton . . .	Oct. 6, 1922	Conviction.
Mederos, Antone . . .	Somerset . . .	Fall River . . .	Sept. 1, 1922	Conviction.
Mederos, Manuel R. . .	Rochester . . .	Wareham . . .	Oct. 13, 1922	Conviction.
Nikander, Wiano . . .	Fitchburg . . .	Fitchburg . . .	July 13, 1922	Conviction.
Ojala, Abraham . . .	Rockport . . .	Gloucester . . .	June 20, 1922	Conviction. ¹
O'Neil, Patrick J. . .	South Tewksbury . . .	Lowell . . .	May 9, 1922	Conviction.
Pappas, Nicholas . . .	Ipswich . . .	Ipswich . . .	May 2, 1922	Conviction.
Peck, George H. . .	South Hanson . . .	Abington . . .	July 26, 1922	Conviction.
Penney, Henry J. . .	Saugus . . .	Malden . . .	Oct. 24, 1922	Conviction.
Phillips, Frank . . .	Norwood . . .	Dedham . . .	Mar. 28, 1922	Conviction.
Rich, Millard F. . .	North Truro . . .	Provincetown . . .	Aug. 24, 1922	Conviction.
Rowe, James H. . .	Ashland . . .	Framingham . . .	May 24, 1922	Conviction.
Santos, Manuel F. . .	South Dartmouth . . .	New Bedford . . .	Oct. 21, 1922	Conviction.
Sehruender, Bernard . . .	Methuen . . .	Lawrence . . .	Aug. 4, 1922	Conviction. ³
Shoreman, Jacob . . .	Amesbury . . .	Amesbury . . .	Mar. 31, 1922	Conviction. ²
Sousa, Louis . . .	Fall River . . .	Fall River . . .	Dec. 13, 1921	Conviction.
Sousa, Manuel . . .	Dartmouth . . .	New Bedford . . .	Dec. 20, 1921	Conviction.
Yokhsoolian, Bagdasai . . .	Lawrence . . .	Lawrence . . .	July 25, 1922	Conviction. ¹
Zitka, Alois C. . .	Belchertown . . .	Palmer . . .	Nov. 24, 1922	Conviction.

¹ Appealed.² Fined \$50; sentence suspended.³ Guilty; sentence suspended.

Selling Milk without the Name or License Number on the Wagon.

NAME.	Address.	Court.	Date.	Result.
Yokhsoolian, Bagdasai .	Lawrence . . .	Lawrence . . .	July 25, 1922	Conviction. ¹

For Sale of Adulterated Foods Other than Milk and Milk Products.

ICE CREAM.

[Low in fat.]

Bliss, George L. and Thomas Scully	East Boston . . .	East Boston . . .	Mar. 8, 1922	Discharged.
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ICE CREAM.

[False advertising.]

Evalyn, James G.	Ipswich	Ipswich	Oct. 31, 1922	Conviction.
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MAPLE SUGAR.

[Contained cane sugar.]

Sanedas, John	New Bedford . . .	New Bedford . . .	Mar. 7, 1922	Conviction.
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OLIVE OIL.

[Adulterated with foreign oil.]

Carra, Dominic Italy Commercial Company	Somerville New York City . .	Somerville United States District Court for New York.	Apr. 4, 1922 Oct. 16, 1922	Conviction. Conviction.
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VANILLA SUBSTITUTE.

[Falsely advertised as pure vanilla.]

Kronick, Julius	North Adams . . .	North Adams . . .	July 27, 1922	Conviction.
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SAUSAGE.

[Contained starch in excess of 2 per cent.]

Almond, David	Lowell	Lowell	Jan. 3, 1922	Conviction.
Anesiewicz, Jose	Northampton . . .	Northampton . . .	Feb. 10, 1922	Conviction. ²
Ashworth, John	Lowell	Lowell	Jan. 3, 1922	Conviction.
Bernier, Henry	Easthampton . . .	Northampton . . .	Apr. 28, 1922	Conviction.
Boston Sausage Company .	Worcester	Worcester	Jan. 3, 1922	Conviction. ¹
Boston Sausage & Provision Company	Boston	Lawrence	Dec. 28, 1921	Conviction.
Boston Sausage & Provision Company	Boston	Haverhill	Jan. 16, 1922	Conviction.
Eastern Provision Co. Inc. (3 counts)	Fall River	New Bedford . . .	Mar. 7, 1922	Conviction.

¹ Appealed.² Fined \$25; sentence suspended.

For Sale of Adulterated Foods Other than Milk and Milk Products — Concluded.

SAUSAGE — Concluded.

[Contained starch in excess of 2 per cent.]

NAME.	Address.	Court.	Date.	Result.
Fugere, Edmond . . .	Easthampton . . .	Northampton . . .	Apr. 28, 1922	Conviction.
Heroux, Hormidas . . .	Lowell . . .	Lowell . . .	Jan. 26, 1922	Conviction.
Lishner, Barney . . .	Boston . . .	Stoughton . . .	Feb. 13, 1922	Conviction.
Markey, Michael F. . .	Lawrence . . .	Lawrence . . .	Feb. 23, 1922	Conviction. ¹
Moreau, Wilfred . . .	Lowell . . .	Lowell . . .	Feb. 9, 1922	Conviction.
Parks Sausage & Provision Company (3 counts) . . .	Boston . . .	Lowell . . .	Dec. 22, 1921	Conviction.
Rzesotarski, John . . .	Holyoke . . .	Holyoke . . .	Feb. 2, 1922	Conviction.
Snigorski, Joseph . . .	Lawrence . . .	Lawrence . . .	Dec. 21, 1921	Conviction.
Thompson, Alfred . . .	North Andover . . .	Lawrence . . .	Jan. 25, 1922	Conviction.
Weitz, Carl A. . . .	Boston . . .	Boston . . .	Apr. 12, 1922	Conviction. ²
Zasadzinski, Michael . . .	Holyoke . . .	Holyoke . . .	Feb. 2, 1922	Conviction.

SAUSAGE.

[Contained coloring matter.]

Boston Sausage & Provision Company . . .	Boston . . .	Haverhill . . .	Jan. 16, 1922	Discharged.
Furtado, Caetano M. . .	Fall River . . .	Fall River . . .	Apr. 4, 1922	Conviction.
Gelt, Samuel . . .	Lawrence . . .	Lawrence . . .	Dec. 21, 1921	Conviction. ²
Krauss, John . . .	New Bedford . . .	New Bedford . . .	Jan. 10, 1922	Conviction.
Schmidt, Jacob . . .	New Bedford . . .	New Bedford . . .	Jan. 27, 1922	Conviction.
Von Bank, George . . .	New Bedford . . .	New Bedford . . .	Jan. 10, 1922	Conviction.

VINEGAR.

[Low in acid.]

Bazar, Simon . . .	Providence, R. I. . .	Fall River . . .	June 1, 1922	Conviction. ²
Dupius, Adjutor . . .	Fall River . . .	Fall River . . .	June 13, 1922	Conviction.
Hornstein, Joseph . . .	Providence, R. I. . .	Fall River . . .	Apr. 26, 1922	Conviction.
Hornstein, Joseph . . .	Providence, R. I. . .	Fall River . . .	June 1, 1922	Conviction. ²
Leviss, Hyman . . .	Fall River . . .	Fall River . . .	June 13, 1922	Conviction.
The I. Renaud Company . . .	Fall River . . .	Fall River . . .	July 14, 1922	Conviction.

Eggs.

DECOMPOSED; UNFIT FOR FOOD.

Farrah, Louis J. . . .	Lawrence . . .	Lawrence . . .	Feb. 28, 1922	Conviction. ³
Heisson Co. Inc. . . .	Fitchburg . . .	Fitchburg . . .	Nov. 17, 1922	Conviction.
Koval, Adolph F. . . .	Norwood . . .	Dedham . . .	Nov. 29, 1922	Conviction.
Morris & Co. . . .	Lawrence . . .	Lawrence . . .	Feb. 28, 1922	Conviction. ²
Ozorowsky, David . . .	Lawrence . . .	Lawrence . . .	Dec. 28, 1921	Conviction.
Riskin, Harry . . .	Springfield . . .	Springfield . . .	Nov. 23, 1922	Conviction.
Saites, Gust . . .	Springfield . . .	Springfield . . .	Mar. 23, 1922	Conviction.
Singal, Morris . . .	Springfield . . .	Springfield . . .	Nov. 23, 1922	Conviction.
Stumbos, John D. . . .	Springfield . . .	Springfield . . .	Mar. 23, 1922	Conviction.
United Fisheries Co. . . .	Gloucester . . .	Gloucester . . .	Jan. 31, 1922	Conviction.

FALSE ADVERTISING — SALE OF EGGS WHICH WERE NOT FRESH AS FRESH EGGS.

Harring, Herbert . . .	East Boston . . .	East Boston . . .	Dec. 9, 1921	Conviction.
Hood & Son, H. P. . . .	Waltham . . .	Waltham . . .	Dec. 23, 1921	Conviction. ²
Levitt, David B. . . .	Springfield . . .	Springfield . . .	Feb. 9, 1922	Conviction.
Miller, Jack . . .	New Bedford . . .	New Bedford . . .	Jan. 27, 1922	Dismissed.
Russell, Perry T. . . .	Newton . . .	Newton . . .	Nov. 7, 1922	Conviction.
Sweet, Frank F. . . .	Winthrop . . .	East Boston . . .	Dec. 9, 1921	Conviction.

¹ Nolo contendere; continued for sentence.² Appealed.³ Guilty; sentence suspended.

Eggs—Continued.

MISBRANDED.

NAME.	Address.	Court.	Date.	Result.
Boston Egg Company, Inc.	Boston	Salem	Dec. 13, 1921	Conviction. ¹
Boston Egg Company, Inc.	Boston	Salem	Dec. 13, 1921	Conviction. ¹
John T. Connor Company .	Fitchburg	Fitchburg	Nov. 17, 1922	Conviction.
John T. Connor Company .	Fall River	Fall River	Nov. 21, 1922	Conviction.
Cooperative Grocery Stores Co.	Springfield	Springfield	Nov. 23, 1922	Conviction.
Economy Grocery Stores Company	Norwood	Dedham	Nov. 28, 1922	Conviction.
Griffin, Ira S. . . .	Providence, R. I. . .	Fall River	Nov. 21, 1922	Conviction.
National Creamery Co. . .	Boston	Concord	Jan. 17, 1922	Discharged.
Shawmut Egg Co. . . .	Boston	Peabody	Jan. 18, 1922	Conviction.

SELLING COLD-STORAGE EGGS WITHOUT MARKING THE CONTAINER.

Aironen, Henry	Fitchburg	Fitchburg	Nov. 15, 1922	Conviction.
Baldwin, Herbert L. . . .	Holyoke	Holyoke	Dec. 10, 1921	Conviction.
Bertini, Frank	Salem	Salem	Dec. 13, 1921	Conviction.
Brockleman Brothers, Inc. .	Clinton	Clinton	Dec. 16, 1921	Conviction.
Brockleman Brothers, Inc. .	Clinton	Clinton	Dec. 16, 1921	Discharged.
Burke, Austin W. . . .	Clinton	Clinton	Dec. 16, 1921	Conviction.
Bushup, Charles	Springfield	Springfield	Nov. 23, 1922	Conviction.
Carreiro, Antoine P. . . .	Gloucester	Gloucester	Jan. 31, 1922	Conviction.
Christopher, Rocco	Haverhill	Haverhill	Dec. 14, 1921	Conviction.
Colodny, Meyer	Springfield	Springfield	Nov. 23, 1922	Conviction.
Curhan, Harry	Gloucester	Gloucester	Jan. 31, 1922	Conviction.
DeBellefeuille, Ulric . . .	Leominster	Leominster	Nov. 21, 1922	Conviction.
Deconto, Sarephin	Fall River	Fall River	Nov. 21, 1922	Conviction.
Diprimo, Salvatore	Lawrence	Lawrence	Feb. 23, 1922	Conviction.
Dounis, Romisis	Haverhill	Haverhill	Dec. 17, 1921	Conviction.
Feldman, Joseph	Springfield	Springfield	Nov. 23, 1922	Conviction. ¹
Foley, James E. . . .	Springfield	Springfield	Nov. 23, 1922	Conviction.
Francisci, Ceasar	Leominster	Leominster	Nov. 21, 1922	Conviction.
Gauthier, Edward	Holyoke	Holyoke	Nov. 28, 1922	Conviction.
Gelt, Samuel	Lawrence	Lawrence	Jan. 30, 1922	Conviction.
Giardini, Archilles	Haverhill	Haverhill	Dec. 17, 1921	Conviction.
Glote, Michael	Fitchburg	Fitchburg	Nov. 15, 1922	Conviction.
Gold, Louis	Holyoke	Holyoke	Dec. 8, 1921	Conviction.
Goldman, Charles	Holyoke	Holyoke	Dec. 9, 1921	Conviction.
Gonzalez, Angel	Westfield	Westfield	Feb. 17, 1922	Conviction. ²
Gorontgos, George	Lowell	Lowell	Feb. 9, 1922	Conviction.
Gould, Nathan	Clinton	Clinton	Dec. 16, 1921	Conviction.
Grace, Antoine	Gloucester	Gloucester	Jan. 31, 1922	Conviction.
Grady, Henry	Clinton	Clinton	Dec. 16, 1921	Conviction.
Grenier, Alfred	Fall River	Fall River	Nov. 21, 1922	Conviction.
Harkonen, Andrew	Fitchburg	Fitchburg	Nov. 15, 1922	Conviction.
Hilferty, James J. . . .	Maynard	Concord	Dec. 23, 1921	Conviction.
Ianueculio, Antonio	Lawrence	Lawrence	Feb. 23, 1922	Conviction.
Jarvinen, John	Fitchburg	Fitchburg	Nov. 17, 1922	Conviction.
Kluk, Thomas	Fitchburg	Fitchburg	Nov. 17, 1922	Conviction.
Korontzis, Andrew T. . . .	Holyoke	Holyoke	Dec. 8, 1921	Conviction. ¹
Kutensky, Vassel	Lowell	Lowell	Dec. 22, 1921	Conviction.
Lachut, Joseph	Holyoke	Holyoke	Dec. 8, 1921	Conviction.
Lantis, Evgelos	Lowell	Lowell	Dec. 22, 1921	Conviction.
Lawrence, Joseph	Holyoke	Holyoke	Nov. 28, 1922	Conviction.
Leary, John D. . . .	Holyoke	Holyoke	Dec. 9, 1921	Conviction.
Levitt, David B. . . .	Springfield	Springfield	Feb. 9, 1922	Conviction.
Loccont, Patrick	Haverhill	Haverhill	Dec. 14, 1921	Conviction.
Lococo, Ignacio	Northampton	Northampton	Jan. 20, 1922	Conviction. ³
Loli, Mili	Hudson	Hudson	Jan. 3, 1922	Conviction.
Malakos, Spiros	Haverhill	Haverhill	Dec. 14, 1921	Conviction.
Mandel, Max	Lawrence	Lawrence	Dec. 21, 1921	Conviction. ¹
Maria, John	Lowell	Lowell	Feb. 14, 1922	Conviction.
Mattis, George	Fitchburg	Fitchburg	Nov. 17, 1922	Conviction.
Montuori, Raphael	Fitchburg	Fitchburg	Nov. 15, 1922	Conviction.
Nole, Daniel	Fitchburg	Fitchburg	Nov. 15, 1922	Conviction.
Paquett, Oscar	Fall River	Fall River	Dec. 13, 1921	Conviction.
Perreault, George	Holyoke	Holyoke	Nov. 28, 1922	Conviction.

¹ Appealed.² Fined \$10; sentence suspended one year.³ Fined \$25; sentence suspended until Jan. 20, 1925.

Eggs—Concluded.

SELLING COLD-STORAGE EGGS WITHOUT MARKING THE CONTAINER—Concluded.

NAME.	Address.	Court.	Date.	Result.
Peters, Chas.	Haverhill	Haverhill	Dec. 17, 1921	Conviction.
Podzuidnas, George	Haverhill	Haverhill	Dec. 14, 1921	Conviction.
Pontes, Seraphim J.	Fall River	Fall River	Nov. 21, 1922	Conviction.
Powers, William	Clinton	Clinton	Dec. 16, 1921	Conviction.
Rezzo, Santo	Lawrence	Lawrence	Dec. 21, 1921	Conviction.
Riopel, Lucien	Holyoke	Holyoke	Dec. 9, 1921	Conviction.
Rollo, Rocco	Fitchburg	Fitchburg	Nov. 17, 1922	Conviction.
Ruane, Martin	Clinton	Clinton	Dec. 16, 1921	Conviction.
Ryll, Gustav	Clinton	Clinton	Dec. 16, 1921	Conviction.
Sauve, Joseph R.	Leominster	Leominster	Nov. 21, 1922	Conviction.
Schnieder, Joseph	Lawrence	Lawrence	Feb. 15, 1922	Conviction.
Shnirman, Hyman	Peabody	Peabody	Jan. 18, 1922	Discharged.
Siedlecki, Frank	Holyoke	Holyoke	Dec. 9, 1921	Conviction. ²
Sieft, George F.	Clinton	Clinton	Dec. 16, 1921	Conviction.
Silva, James B.	Gloucester	Gloucester	Jan. 31, 1922	Conviction.
Silva, Manuel P.	Gloucester	Gloucester	Jan. 31, 1922	Conviction.
Singal, Morris	Springfield	Springfield	Nov. 23, 1922	Conviction.
Spinelli, Michael	Northampton	Northampton	Jan. 20, 1922	Conviction. ¹
Studnick, Jacob	Lawrence	Lawrence	Dec. 21, 1921	Conviction. ²
Taraszk, Karol	Westfield	Westfield	Feb. 17, 1922	Conviction. ³
Tessier, Wilfred T.	Leominster	Leominster	Nov. 21, 1922	Conviction.
United Cooperative Society	Fitchburg	Fitchburg	Nov. 17, 1922	Conviction.
United Fisheries Company	Gloucester	Gloucester	Jan. 31, 1922	Conviction.
Vurgaropoulos, Constantine	Lowell	Lowell	Dec. 22, 1921	Conviction.
Yankopolos, James	Fall River	Fall River	Nov. 28, 1922	Conviction.
Yenofsky, Isaac	Lawrence	Lawrence	Dec. 21, 1921	Conviction.

ABSENCE OF SIGN "COLD STORAGE EGGS."

Pyros, Louis	Fall River	Fall River	Nov. 21, 1922	Conviction.
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For Sale of Decomposed Food.

PORK CHOP.

Fenton, Joseph A.	Norwood	Dedham	Mar. 6, 1922	Conviction.
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For Sale of Drugs deficient in Strength.

LIME WATER.

Bruzgas, William C.	Norwood	Dedham	July 10, 1922	Conviction.
Bruzgas, William C.	Norwood	Dedham	July 10, 1922	Conviction.

MAGNESIUM CITRATE.

Caisse, Wilfred P.	Lowell	Lowell	Aug. 1, 1922	Discharged.
Diamond Chemical Co.	Somerville	Lowell	Sept. 8, 1922	Discharged.
Diamond Chemical Co.	Somerville	Lowell	Sept. 8, 1922	Discharged.
Lantagne, Joseph T.	Lowell	Lowell	Aug. 1, 1922	Discharged.
Lawrence Wholesale Drug Company	Lawrence	Lowell	Sept. 8, 1922	Discharged.
Lawrence Wholesale Drug Company	Lawrence	Lowell	Sept. 8, 1922	Discharged.
Union Wholesale Drug Company	Boston	Boston	Aug. 2, 1922	Conviction.
Wright, George C.	Somerville	Lowell	Aug. 1, 1922	Conviction. ²
Wright, George C. (2 counts)	Somerville	Lowell	Aug. 1, 1922	Conviction. ²

¹ Fined \$25; sentence suspended.² Appealed.³ Fined \$10; sentence suspended.

For Sale of Drugs deficient in Strength — Concluded.

SWEET SPIRIT OF NITRE.

NAME.	Address.	Court.	Date.	Result.
Bulduc, Joseph Alexander .	Fall River . . .	Fall River . . .	Dec. 29, 1921	Conviction.
LeBeau, Randall . . .	Fall River . . .	Fall River . . .	Dec. 29, 1921	Conviction.

TURPENTINE.

Ballou, H. A. . . .	Worcester . . .	Worcester . . .	Sept. 13, 1922	Conviction. ¹
Dixon's Paint & Oil Store .	Worcester . . .	Worcester . . .	Sept. 13, 1922	Conviction.

*For Violation of the Laws relative to Cold Storage.*HOLDING ARTICLES OF FOOD IN COLD STORAGE FOR A PERIOD LONGER THAN TWELVE MONTHS
WITHOUT THE CONSENT OF THE DEPARTMENT OF PUBLIC HEALTH.

Connizzio, Frank . . .	Boston . . .	Boston . . .	Feb. 7, 1922	Conviction.
John, Peter . . .	Boston . . .	Boston . . .	Dec. 29, 1921	Conviction.

RETAILING COLD-STORAGE GOODS WITHOUT DISPLAYING A SIGN MARKED "COLD STORAGE
GOODS SOLD HERE."

Lucier, Elzear . . .	Fall River . . .	Fall River . . .	Nov. 21, 1922	Conviction.
Placida, Joseph . . .	Fall River . . .	Fall River . . .	Nov. 21, 1922	Conviction.

For Violation of the Laws relative to Slaughtering.

ILLEGAL USE OF STAMP.

Holden, Charles E. . .	Peabody . . .	Peabody . . .	Mar. 27, 1922	Conviction. ²
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ILLEGAL USE OF STAMP BY MEMBER OF BOARD OF HEALTH.

Skinner, Walter B. . .	Braintree . . .	Quincy . . .	June 26, 1922	Conviction.
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SLAUGHTERING OR AUTHORIZING SLAUGHTERING IN THE ABSENCE OF INSPECTOR.

Bowman, Frank . . .	Arlington . . .	Cambridge . . .	Feb. 20, 1922	Discharged.
Cohen, Max . . .	Methuen . . .	Lawrence . . .	Apr. 21, 1922	Conviction. ³
Gould, William (2 counts) .	Peabody . . .	Peabody . . .	Mar. 27, 1922	Dismissed.
Kotarski, Louis . . .	Peabody . . .	Peabody . . .	Mar. 27, 1922	Conviction. ²
Merceri, Matthew . . .	Monson . . .	Palmer . . .	Apr. 7, 1922	Conviction.
Norcross, Austin L. . .	Wenham . . .	Salem . . .	July 25, 1922	Conviction.
Sugarman, Julius . . .	Greenfield . . .	Greenfield . . .	Dec. 29, 1921	Conviction. ²
Thayer, Edward A. . .	Braintree . . .	Quincy . . .	June 26, 1922	Conviction.
Voloch, Abraham . . .	Dracut . . .	Lowell . . .	Sept. 12, 1922	Conviction.
Voloch, Joseph . . .	Dracut . . .	Lowell . . .	Sept. 12, 1922	Conviction.

¹ Appealed.² Guilty; sentence suspended.³ Guilty; continued for sentence.

For Violation of the Laws relative to Slaughtering—Concluded.

SELLING, OFFERING FOR SALE, OR HAVING IN POSSESSION WITH INTENT TO SELL, UNSTAMPED MEAT.

NAME.	Address.	Court.	Date.	Result.
Baker, Charles A. . . .	Randolph	Quincy	June 26, 1922	Dismissed.
Bleistein, Edward . . .	Medford	Malden	Jan. 10, 1922	Conviction.
Bowman, Frank	Arlington	Cambridge . . .	Feb. 20, 1922	Discharged.
Carpenter, James . . .	Stephentown, N. Y. .	Pittsfield . . .	Apr. 6, 1922	Conviction.
Cohen, Max	Methuen	Methuen	Apr. 21, 1922	Discharged.
Galloway, Thomas E. . .	Lawrence	Lawrence	Jan. 25, 1922	Conviction.
Guelli, Francesco . . .	Lawrence	Lawrence	Feb. 3, 1922	Conviction.
Jordan, Samuel	Salem	Salem	May 26, 1922	Conviction.
Merceri, Matthew . . .	Monson	Palmer	Apr. 7, 1922	Dismissed.
Meyer, Isaac	New Bedford	New Bedford . .	Nov. 18, 1922	Conviction.
Pugach, Maurice	Malden	Somerville . . .	Jan. 18, 1922	Conviction.

SALE OF VEAL, CARCASS WEIGHING LESS THAN FORTY POUNDS.

Jacobson, Max	Worcester	Clinton	Feb. 13, 1922	Discharged.
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AS INSPECTOR OF SLAUGHTERING VIOLATED THE REGULATIONS OF THE DEPARTMENT.

Wiles, Moses	Brewster	Harwich	Dec. 16, 1921	Conviction.
Persick, Jacob	Greenfield	Greenfield . . .	Dec. 29, 1921	Conviction.

SLAUGHTERING WITHOUT LICENSE.

Galloway, Thomas E. . .	Lawrence	Lawrence	Jan. 25, 1922	Conviction. ¹
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For Violation of the Mattress Laws.

Bay State Bedding Co. .	Springfield	Springfield . . .	Nov. 8, 1922	Conviction.
Donovitz, Allei	Stoughton	Stoughton	Aug. 18, 1922	Conviction.
Feldman, Max	Lynn	Lynn	Aug. 4, 1922	Conviction.
Fellows & Co.	Boston	Boston	July 12, 1922	Conviction.
Fellows, Frank C. . . .	Boston	Boston	July 12, 1922	Dismissed.
Fogg, Charles E.	Boston	Boston	July 21, 1922	Discharged.
Gladstone, Benjamin . .	Lynn	Lynn	Aug. 4, 1922	Conviction.
Gorinstein, Philip . . .	Boston	Boston	June 30, 1922	Conviction.
Katz, Jacob	Pittsfield	Pittsfield	Nov. 1, 1922	Conviction.
Katz, Jacob	Pittsfield	Pittsfield	Nov. 1, 1922	Dismissed.
Lanes, Abraham	Lynn	Lynn	Aug. 4, 1922	Conviction.
Lawrence Mattress Co. .	Lawrence	Lawrence	Aug. 3, 1922	Conviction. ²
Levine, Charles	Boston	Boston	July 12, 1922	Conviction.
Malick, Benjamin	Lynn	Lynn	Aug. 10, 1922	Conviction. ²
Montalbano, Paul	Boston	Boston	June 30, 1922	Conviction.
Perlmutter, Myer	Boston	Boston	Aug. 1, 1922	Conviction.
Rosenbloom, Joseph . . .	Boston	Boston	July 18, 1922	Conviction.
Salem Mattress Company .	Boston	Salem	Aug. 17, 1922	Conviction.
Schneider, Isaac	Lawrence	Lawrence	Aug. 3, 1922	Conviction.
Schneider, Isaac	Lawrence	Lawrence	Aug. 3, 1922	Conviction.
Seeche, Maurice	Lawrence	Lawrence	Aug. 3, 1922	Conviction. ²
Solomon, Samuel	Boston	Boston	June 30, 1922	Conviction.
Warsbaver, Rubin	Boston	Boston	June 30, 1922	Conviction.
Yaffe, Abraham	Beverly	Salem	Aug. 11, 1922	Conviction. ²
Young, Hyman	Chelsea	Chelsea	July 25, 1922	Conviction.

¹ Guilty; sentence suspended.¹ Appealed.

TABLE NO. 2. — *Summary of Milk Samples examined.*

MONTH.	Above Standard.	Below Standard.	Total Samples.	Cream removed.	SKIMMED.		Watered Samples.	AVERAGE OF ALL SAMPLES.			Number of Samples.	AVERAGE OF GOOD SAMPLES.		
					Above Standard.	Below Standard.		Solids.	Fat.	Solids not Fat.		Solids.	Fat.	Solids not Fat.
1921.														
December	340	44	384	11	-	-	4	12.51	3.78	8.73	369	12.72	3.87	8.85
1922.														
January	255	79	334	4	-	-	30	12.72	3.87	8.85	300	12.82	3.85	8.97
February	266	68	334	4	-	-	13	12.46	3.74	8.72	319	12.52	3.76	8.76
March	592	151	743	15	-	-	13	12.44	3.74	8.70	724	12.50	3.77	8.73
April	591	240	831	10	-	-	29	12.25	3.64	8.61	787	12.30	3.66	8.64
May	564	304	868	27	1	1	8	12.29	3.72	8.57	818	12.30	3.74	8.56
June	559	253	812	20	-	-	22	12.27	3.72	8.55	763	12.36	3.78	8.55
July	529	265	794	16	-	-	22	12.31	3.77	8.55	744	12.45	3.83	8.62
August	434	344	778	7	-	-	52	12.13	3.74	8.39	710	12.22	3.78	8.44
September	359	126	485	7	-	-	5	12.33	3.79	8.55	472	12.40	3.84	8.56
October	308	76	384	10	-	-	7	12.41	3.77	8.64	367	12.50	3.84	8.66
November	313	44	357	2	-	-	7	12.62	3.88	8.74	348	12.65	3.88	8.77
Totals	5,115	1,994	7,104	132	1	2	217	12.36	3.75	8.61	6,752	12.62	3.84	8.78

TABLE No. 3. — *Summary of Food Samples examined.*

CHARACTER OF SAMPLE.	Legal.	Illegal.	Total.
Butter	38	6	44
Canned Goods	7	—	7
Cheese	2	—	2
Chocolate and Cocoa	2	—	2
Cider	15	9	24
Clams	2	1	3
Coffee	2	—	2
Condensed Milk	7	1	8
Cream	20	6	26
Eggs	102	195	297
Honey	18	6	24
Flavoring Extracts	6	—	6
Ice Cream	44	1	45
Maple Sugar	4	2	6
Maple Syrup	10	1	11
Nuts	31	3	34
Sausages	823	130	953
Miscellaneous	35	2	37
Molasses	9	15	24
Noodles	3	—	3
Olive Oil	15	1	16
Salad Dressing	1	—	1
Scallops	46	22	68
Soft Drinks	90	4	94
Soda Water Syrups	1	—	1
Spices	2	—	2
Tea	12	—	12
Vinegar	237	86	323
Totals	1,584	491	2,075

TABLE No. 4. — *Summary of Drug Samples examined.*

CHARACTER OF SAMPLE.	Legal.	Illegal.	Total.
Bay rum	5	—	5
Camphor liniment	16	2	18
Hamamelis water	5	—	5
Linseed oil	3	—	3
Lime water	35	4	39
Magnesium citrate solution	35	14	49
Methylene blue	2	—	2
Miscellaneous and proprietary drugs	76	—	76
Potassium bicarbonate	18	—	18
Seidlitz powder	1	—	1
Spirit of camphor	1	—	1
Spirit of nitrous ether	41	43	84
Spirit of peppermint	2	—	2
Tincture of digitalis	6	—	6
Tincture of ginger (double strength)	—	3	3
Tincture of iodine	1	—	1
Turpentine	2	2	4
Totals	249	68	317

TABLE NO. 5. — *Summary of Liquor Samples examined.*

	Beer.	Cider.	Wines.	Dis- tilled Liquors.	Flavor- ing Ex- tracts.	Alcohol.	Miscel- laneous.	Total.
Arlington	2	3	3	25	—	2	1	36
Athol	3	2	2	20	3	—	1	31
Ayer	—	—	11	29	—	1	—	41
BEVERLY	2	—	8	4	—	—	—	14
BOSTON	100	6	75	2,204	24	150	95	2,654
Brookline	2	—	4	31	—	—	—	37
CAMBRIDGE	11	1	35	326	4	17	12	406
CHELSEA	2	—	—	21	2	1	1	27
CHICOPEE	5	2	—	5	—	—	—	12
Clinton	—	—	7	6	—	—	—	13
Dedham	—	—	1	14	—	1	1	17
EVERETT	1	—	—	8	—	—	1	10
FALL RIVER	12	2	6	172	1	—	3	193
FITCHBURG	23	8	1	6	—	—	—	38
Framingham	5	—	1	4	—	—	—	10
Franklin	8	—	—	2	—	—	1	11
GLOUCESTER	6	—	6	20	1	6	9	48
Haverhill	9	—	9	10	3	1	—	32
HOLYOKE	6	1	—	2	—	—	—	11
Hudson	2	—	3	24	2	—	3	34
Ipswich	5	9	7	8	1	—	5	35
LAWRENCE	35	—	12	141	1	29	11	229
LEOMINSTER	7	—	3	3	—	3	—	16
LOWELL	68	6	10	323	2	10	10	429
LYNN	17	2	8	110	—	3	18	158
MALDEN	1	—	2	49	—	1	—	53
MARLBOROUGH	4	—	—	9	—	—	1	14
Maynard	—	—	—	10	—	1	1	12
Milford	1	—	25	10	—	—	—	36
Natick	—	—	3	12	—	—	—	15
NEWBURYPORT	4	5	2	4	2	—	—	17
NEWTON	1	—	11	19	—	—	1	32
Norwood	1	3	4	39	—	—	—	47
PITTSFIELD	—	1	7	9	—	—	—	17
QUINCY	—	—	—	15	—	1	—	16
REVERE	4	—	—	20	—	2	8	34
Rockland	6	—	3	7	—	—	—	16
SALEM	1	—	1	11	2	2	—	17
Salisbury	21	—	3	3	—	—	—	27
Saugus	5	—	—	3	—	2	—	10
Shirley	1	—	—	10	—	—	—	11
SOMERVILLE	6	1	6	187	—	4	1	205
SPRINGFIELD	4	—	—	62	4	5	—	75
TAUNTON	20	—	10	35	—	—	8	73
Wakefield	1	—	—	39	2	2	—	44
WALTHAM	4	1	6	5	—	—	1	17
Watertown	—	—	7	6	—	—	—	13
Webster	3	—	1	17	—	—	—	21
West Newbury	—	5	3	6	—	3	—	17
West Springfield	2	—	—	7	3	4	—	16
Woburn	—	—	1	11	—	—	—	12
Department of Public Safety	3	4	5	20	1	2	10	45
Miscellaneous ¹	59	7	39	173	—	15	16	309
	483	69	353	4,316	58	268	219	5,766

¹ From 88 cities and towns submitting less than 10 samples during the year.

TABLE No. 6. — *Articles, Other than Fish, on Hand in Cold Storage on the First Day of the Month from January 1, 1921, through December 1, 1922.*

	Butter (Pounds).	Eggs (Dozens).	Broken- out Eggs (Pounds).	Broilers (Pounds).	Roasters (Pounds).	Fowls (Pounds).	Turkeys (Pounds).	Miscella- neous Poultry (Pounds).	Beef (Pounds).	Pork (Pounds).	Lamb and Mutton (Pounds).	Miscella- neous Meats (Pounds).
January	8,633.375	81,910	410,123	626,062	2,500.217	979,713	683,601	1,581,461	4,222,457	8,364,154	977,437	2,100,253
February	5,529,634	18,220	399,971	608,324	3,104,403	1,392,055	751,790 ^{1/2}	1,791,439	3,183,643	9,790,059	672,385	1,681,146
March	3,820,407	883	434,384	524,883	2,990,688	1,143,947	705,639 ^{1/2}	1,632,929	2,690,454	10,650,771	461,892	1,438,526
April	1,831,098	31,119	468,557	466,506	2,571,773	764,059	737,170 ^{1/2}	1,356,542	2,689,817	12,066,788	444,202	712,383
May	479,531	310,959 ^{1/2}	470,680	403,095	1,971,672	418,323	670,066 ^{1/2}	1,113,931	2,774,070	12,092,695	555,553	605,649
June	1,042,414	526,812 ^{1/2}	662,735	311,862	1,663,500	312,752	578,293 ^{1/2}	1,155,389	2,904,858	12,859,312	345,062	1,006,875
July	10,414,119	617,579 ^{1/2}	989,049	202,887 ^{1/2}	1,111,444	666,098	545,172	1,187,939	3,111,040	13,897,732	596,976	1,311,115
August	15,510,851	620,698 ^{1/2}	1,398,143	175,138	642,742	887,742	473,074 ^{1/2}	1,135,284	2,626,830 ^{1/2}	14,855,542	575,569 ^{1/2}	1,985,531
September	16,431,582	568,476 ^{1/2}	1,677,086	254,345	246,680	678,275	389,461 ^{1/2}	821,459	2,277,161	12,825,073	600,960	2,006,330
October	15,113,156	461,759 ^{1/2}	1,656,175	416,844 ^{1/2}	103,736	417,855	311,234 ^{1/2}	683,295	2,068,644	2,380,049	573,194	1,968,897
November	12,224,692	336,790 ^{1/2}	1,495,773	389,634 ^{1/2}	284,432	224,907	243,100	713,653 ^{1/2}	2,131,757	837,829	638,442	1,423,158
December	9,296,451	211,515	1,341,895	636,805	848,303	271,938	73,334	703,647	2,321,794	1,067,189	636,803 ^{1/2}	1,814,194

TABLE No. 7. — *Fish on Hand in Cold Storage on the Fifteenth Day of the Month from January 15, 1921, through December 15, 1922.*

	Bluefish (Pounds).	Butterfish (Pounds).	Ciscoes (Pounds).	Cod, Hake, Pollock and Haddock (Pounds).	Hallibut (Pounds).	Herring (Pounds).	Mackerel (Pounds).	Fall and Silver Salmon (Pounds).	Salmon, All Other (Pounds).	Shad (Pounds).	Smelts, Eulachon, etc. (Pounds).	Squid (Pounds).	Whitefish (Pounds).	Whiting (Pounds).	Miscellaneous Foreign Fish (Pounds).
January	5,043	176,170	203,513	620,949	1,267,871	1,675,130	553,449	183,967	333,479	21,530	64,643	1,422,199	35,091	2,549,012	453,096
February	3,645	122,350	213,321	362,051	850,248	805,195	304,877	161,376	333,966	12,965	225,182	1,096,535	18,067	1,361,986	261,972
March	3,351	56,258	203,595	230,176	737,510	283,054	263,620	118,466	277,422	12,965	291,333	761,014	11,471	138,250	374,430
April	443	47,795	220,310	83,551	641,098	132,000	107,901	19,458	189,667	17,365	137,219	456,383	4,771	218,562	54,028
May	279	518	104,300	94,160	941,042	318,217	79,611	53,926	200,305	2,245	119,814	526,030	5,261	194,502	97,164
June	279	617	94,040	26,588	944,639	406,540	1,073,086	45,445	115,455	2,245	116,820	884,825	300	1,105,014	548,685
July	4,166	46,048	24,895	32,434	965,223	648,389	1,481,590	44,624	117,109	550	106,976	891,337	300	2,866,373	245,513
August	1,480	134,848	53,840	45,217	1,071,353	648,389	1,710,847	43,599	100,659	18,729	105,236	921,780	—	3,655,797	892,367
September	1,064	157,287	57,304	68,275	1,066,395	834,992	1,838,780	235,800	11,534	17,657	105,236	818,761	—	3,836,428	1,035,833
October	3,522	201,686	54,151	82,885	1,004,926	1,958,089	2,815,031	301,622	12,437	20,177	104,411	752,250	—	3,923,844	1,055,885
November	4,532	201,064	99,801	120,115	760,285	2,114,847	3,137,091	251,544	160,798	20,590	89,997	642,257	—	3,628,010	859,074
December	3,231	113,738	154,606	165,738	489,851	1,634,325	2,390,647	271,457	141,608	20,222	42,652	166,084	300	2,810,459	653,145

TABLE No. 8. — *Articles, Other than Fish, placed in Cold Storage from December 1, 1921, to December 1, 1922.*

		Butter (Pounds).	Eggs (Dozens).	Broken- out Eggs (Pounds).	Broilers (Pounds).	Roasters (Pounds).	Fowls (Pounds).	Turkeys (Pounds).	Miscella- neous Poultry (Pounds).	Beef (Pounds).	Pork (Pounds).	Lamb and Mutton (Pounds).	Miscella- neous Meats (Pounds).
December	.	718,064	17,635	133,984	106,282	1,521,360	778,159	755,239	781,413	677,372	1,139,000	270,680	2,368,488
January	.	609,012	11,653	209,180	67,017	809,064	568,160	179,898½	466,638	401,103	1,981,977	188,981	1,930,400
February	.	879,339	7,315	271,983	14,515	303,197	165,440	64,761	191,169	391,276	1,836,341	106,436	827,876
March	.	980,315	34,985	242,648	50,349	258,691	119,842	131,350	248,465	499,598	2,138,049	166,676	592,411
April	.	670,267	288,027	166,368	30,668	152,814	104,980	13,402	66,292	589,864	1,312,404	578,012	550,253
May	.	1,411,481	236,717	412,772	57,145	360,869	192,234	41,656	355,862	884,415	2,150,015	187,466½	913,936
June	.	10,716,466	128,708	538,298	13,126	93,359	528,951	42,156	328,195	755,896	2,434,635	378,440½	825,421
July	.	7,109,166	58,076	470,676	16,175	27,112	452,478	12,153	281,131	401,647	2,434,635	210,236	1,154,821
August	.	3,925,782	38,679	512,136	108,200	19,495	144,695	30,111	175,009½	1,632,978	1,632,978	132,629	1,410,448
September	.	2,418,093	13,336	215,158	179,609	84,752	68,797	13,556	135,550	380,319	1,160,703	89,277	911,641
October	.	1,716,307	16,230	153,210	193,114	374,285	38,586	13,897	212,457	484,942	1,953,336	101,506	911,724
November	.	2,104,675	14,817	154,061	97,559	670,011	169,484	76,213	243,214	776,066	1,966,397	84,273	1,417,265

TABLE No. 9. — *Fish placed in Cold Storage from December 1, 1921, to December 1, 1922.*

	Bluefish (Pounds).	Butterfish (Pounds).	Ciscoes (Pounds).	Cod, Hake, Pollock and Haddock (Pounds).	Halibut (Pounds).	Herring (Pounds).	Mackerel (Pounds).	Fall and Silver Salmon (Pounds).	Salmon, All Other (Pounds).	Shad (Pounds).	Smelts, Eulachon, etc. (Pounds).	Squid (Pounds).	Whitefish (Pounds).	Whiting (Pounds).	Miscellaneous Frozen Fish (Pounds).
December	.	.	57,790	112,023	199,628	101,595	109,563	150,737	294,101	.	65,098	75,000	.	9,564	88,789
January	.	.	25,441	9,448	13,112	45,475	93,983	71,030	60,776	.	205,570	53,881	.	24,941	127,361
February	.	.	19,300	39,292	117,443	123,506	107,508	55,924	50,450	.	147,202	32,070	.	6,489	192,282
March	.	.	46,800	34,750	56,012	337,485	50,780	33,453	7,030	5,400	10,682	10,309	.	11,529	100,662
April	.	.	24,497	8,259	378,447	117,714	13,641	52,254	96,579	4,835	6,562	207,361	1,500	3,750	53,888
May	.	.	750	10,066	78,729	221,180	1,134,449½	1,392	18,506	.	.	378,845	.	821,780	282,093
June	.	.	2,750	18,575	101,744	138,057	573,087	10,290	86,997	550	.	82,765	425	1,858,100	504,103
July	.	.	36,370	27,015	188,404	281,768	288,543	3,114	5,963	18,800	.	121,291	.	838,295	454,757
August	.	.	11,875	34,702	7,470	295,930	210,223	118,023	964	210	.	1,370	.	287,585	360,173
September	.	.	8,565	40,205	51,673	1,223,020	1,088,122	88,593	1,714	3,125	1,115	18,810	.	303,086	330,921
October	.	.	52,200	73,208	38,046	447,827	431,036	131,883	2,045	1,080	3,425	27,755	.	89,315	168,563
November	.	.	61,220	56,734	10,546	61,245	34,680	115,336	31,680	66	575	21,159	300	25,004	88,497

Summary.

Requests for extension of time granted	.	.	.	.	.	.	.	.	.	131
Eggs	.	.	.	.	.	.	.	.	.	4
Poultry	.	.	.	.	.	.	.	.	.	2
Game	.	.	.	.	.	.	.	.	.	1
Meat	.	.	.	.	.	.	.	.	.	66
Fish	.	.	.	.	.	.	.	.	.	58
Requests for extension of time not granted	.	.	.	.	.	.	.	.	.	57
Butter	.	.	.	.	.	.	.	.	.	1
Meat	.	.	.	.	.	.	.	.	.	51
Fish	.	.	.	.	.	.	.	.	.	5
Requests for permission to remove granted	.	.	.	.	.	.	.	.	.	2
Butter	.	.	.	.	.	.	.	.	.	2
Articles ordered removed from storage (no requests made)	.	.	.	.	.	.	.	.	.	141
Eggs	.	.	.	.	.	.	.	.	.	2
Butter	.	.	.	.	.	.	.	.	.	4
Poultry	.	.	.	.	.	.	.	.	.	23
Game	.	.	.	.	.	.	.	.	.	11
Meat	.	.	.	.	.	.	.	.	.	76
Fish	.	.	.	.	.	.	.	.	.	25

TABLE NO. 10. — *Requests for Extension of Time granted on Goods in Cold Storage from December 1, 1921, to December 1, 1922.*

[Reason for such extension being that goods were in proper condition for further storage.]

ARTICLE.	Weight (Pounds).	Placed in Storage.	Extension granted to —	Name.
Eggs (mixed)	4,650	— ¹	Jan. 1, 1923	Fox River Butter Co.
Eggs (mixed)	11,730	May 9, 1921	Aug. 9, 1922	Oveson, Morris.
Egg yolks	1,820	— ¹	Jan. 1, 1923	Fox River Butter Co.
Egg yolks	2,580	May 9, 1921	Aug. 9, 1922	Oveson, Morris.
Broilers	575	Oct. 11, 1921	Nov. 11, 1922	Eastman, Frank B.
Broilers	1,750	Sept. 22, 1921	Oct. 22, 1922	Humphrey, J. L., Jr.
Deer	976	Nov. 29, 1921	Feb. 28, 1923	Dorr, Arthur E., & Co., Inc.
Beef	1,090	Oct. 7, 1921	Dec. 7, 1922	Caron's Market.
Beef	730	July 19, 1921	Aug. 30, 1922	Hodder, Walter W., Co.
Beef	999	Nov. 8, 1921	Jan. 8, 1923	Swift, E. C., & Co.
Beef butts	5,000	Jan. 19, 1921	Mar. 19, 1922	Swift, E. C., & Co.
Beef loins	1,720	May 10, 1921	Aug. 10, 1922	Fletcher, J. V., Co.
Beef loins	1,209	May 20, 1921	Aug. 20, 1922	Fletcher, J. V., Co.
Beef ribs	828	May 10, 1921	Aug. 10, 1922	Fletcher, J. V., Co.
Beef shoulder clods	654	Nov. 30, 1920	Feb. 28, 1922	Squire, John P., & Co.
Beef shoulder clods	1,417	Dec. 3, 1920	Mar. 3, 1922	Squire, John P., & Co.
Beef shoulder clods	109	Dec. 4, 1920	Mar. 4, 1922	Squire, John P., & Co.
Beef shoulder clods	109	Dec. 7, 1920	Mar. 7, 1922	Squire, John P., & Co.
Beef shoulder clods	109	Dec. 8, 1920	Mar. 8, 1922	Squire, John P., & Co.
Beef shoulder clods	109	Dec. 8, 1920	Mar. 8, 1922	Squire, John P., & Co.
Beef shoulder clods	109	Dec. 9, 1920	Mar. 9, 1922	Squire, John P., & Co.
Beef shoulder clods	3,270	Dec. 9, 1920	Mar. 9, 1922	Squire, John P., & Co.
Beef shoulder clods	3,270	Dec. 10, 1920	Mar. 10, 1922	Squire, John P., & Co.
Beef shoulder clods	327	Dec. 10, 1920	Mar. 10, 1922	Squire, John P., & Co.
Beef shoulder clods	109	Dec. 11, 1920	Mar. 11, 1922	Squire, John P., & Co.
Beef shoulder clods	3,161	Dec. 13, 1920	Mar. 13, 1922	Squire, John P., & Co.
Beef shoulder clods	654	Dec. 15, 1920	Mar. 15, 1922	Squire, John P., & Co.
Beef shoulder clods	218	Dec. 16, 1920	Mar. 16, 1922	Squire, John P., & Co.
Beef shoulder clods	6,646	Dec. 16, 1920	Mar. 16, 1922	Squire, John P., & Co.
Beef shoulder clods	763	Dec. 17, 1920	Mar. 17, 1922	Squire, John P., & Co.
Beef shoulder clods	218	Dec. 18, 1920	Mar. 18, 1922	Squire, John P., & Co.
Beef shoulder clods	218	Dec. 18, 1920	Mar. 18, 1922	Squire, John P., & Co.
Beef shoulder clods	218	Dec. 19, 1920	Mar. 19, 1922	Squire, John P., & Co.
Beef shoulder clods	1,199	Dec. 20, 1920	Mar. 20, 1922	Squire, John P., & Co.
Beef shoulder clods	872	Dec. 22, 1920	Mar. 22, 1922	Squire, John P., & Co.
Beef shoulder clods	4,133	Dec. 22, 1920	Mar. 22, 1922	Squire, John P., & Co.
Beef shoulder clods	545	Dec. 23, 1920	Mar. 23, 1922	Squire, John P., & Co.
Beef shoulder clods	3,697	Dec. 24, 1920	Mar. 24, 1922	Squire, John P., & Co.
Beef shoulder clods	218	Dec. 30, 1920	Mar. 30, 1922	Squire, John P., & Co.
Beef shoulder clods	545	Jan. 4, 1921	Apr. 4, 1922	Squire, John P., & Co.

¹ Date of original storage unknown.

TABLE NO. 10.—*Requests for Extension of Time granted on Goods in Cold Storage from December 1, 1921, to December 1, 1922—Continued.*

ARTICLE.	Weight (Pounds).	Placed in Storage.	Extension granted to —	Name.
Beef shoulder clods	981	Jan. 5, 1921	Apr. 5, 1922	Squire, John P., & Co.
Beef shoulder clods	436	Jan. 6, 1921	Apr. 6, 1922	Squire, John P., & Co.
Beef shoulder clods	109	Jan. 7, 1921	Apr. 7, 1922	Squire, John P., & Co.
Beef shoulder clods	654	Jan. 8, 1921	Apr. 8, 1922	Squire, John P., & Co.
Beef shoulder clods	872	Jan. 12, 1921	Apr. 12, 1922	Squire, John P., & Co.
Beef shoulder clods	218	Jan. 13, 1921	Apr. 13, 1922	Squire, John P., & Co.
Beef shoulder clods	981	Jan. 17, 1921	Apr. 17, 1922	Squire, John P., & Co.
Beef shoulder clods	654	Jan. 19, 1921	Apr. 19, 1922	Squire, John P., & Co.
Beef shoulder clods	436	Jan. 20, 1921	Apr. 20, 1922	Squire, John P., & Co.
Beef shoulder clods	109	Jan. 21, 1921	Apr. 21, 1922	Squire, John P., & Co.
Beef shoulder clods	109	Jan. 22, 1921	Apr. 21, 1922	Squire, John P., & Co.
Beef shoulder clods	109	Jan. 22, 1921	Apr. 22, 1922	Squire, John P., & Co.
Beef shoulder clods	218	Jan. 26, 1921	Apr. 26, 1922	Squire, John P., & Co.
Beef shoulder clods	1,199	Jan. 27, 1921	Apr. 27, 1922	Squire, John P., & Co.
Lamb forequarters	449	Dec. 31, 1920	Jan. 31, 1922	New England Dressed Meat & Wool Co.
Lamb forequarters	862	Dec. 31, 1920	Jan. 31, 1922	New England Dressed Meat & Wool Co.
Lamb forequarters	1,496	Dec. 31, 1920	Jan. 31, 1922	New England Dressed Meat & Wool Co.
Lamb legs	677	Dec. 9, 1920	Jan. 9, 1922	New England Dressed Meat & Wool Co.
Lamb legs	224	Dec. 24, 1920	Jan. 24, 1922	New England Dressed Meat & Wool Co.
Lamb legs	1,117	Dec. 24, 1920	Jan. 24, 1922	New England Dressed Meat & Wool Co.
Lamb legs	1,651	Dec. 30, 1920	Jan. 30, 1922	New England Dressed Meat & Wool Co.
Lamb legs	250	Dec. 31, 1920	Jan. 31, 1922	New England Dressed Meat & Wool Co.
Lamb legs	482	Dec. 31, 1920	Jan. 31, 1922	New England Dressed Meat & Wool Co.
Livers, calves'	75	Nov. 22, 1921	Feb. 1, 1923	New England Dressed Meat & Wool Co.
Livers, calves'	60	Nov. 23, 1921	Feb. 1, 1923	New England Dressed Meat & Wool Co.
Livers, calves'	184	Nov. 28, 1921	Feb. 1, 1923	New England Dressed Meat & Wool Co.
Mutton	597	Dec. 2, 1920	Feb. 2, 1922	Dorr, Arthur E., & Co., Inc.
Mutton	2,298	Jan. 27, 1921	Mar. 27, 1922	Dorr, Arthur E., & Co., Inc.
Mutton	1,050	Dec. 6, 1920	Jan. 6, 1922	New England Dressed Meat & Wool Co.
Mutton	1,853	Dec. 9, 1920	Jan. 9, 1922	New England Dressed Meat & Wool Co.
Mutton	3,902	Dec. 15, 1920	Jan. 15, 1922	New England Dressed Meat & Wool Co.
Mutton	1,846	Dec. 18, 1920	Jan. 18, 1922	New England Dressed Meat & Wool Co.
Veal bridles	1,949	Feb. 1, 1921	Mar. 1, 1922	Dorr, Arthur E., & Co., Inc.
Eels	1,380	July 20, 1921	Nov. 20, 1922	Busalacchi, T. & J.
Eels	150	Nov. 30, 1921	Dec. 30, 1922	Corso & Cannizzo.
Eels	1,208	June 28, 1921	Dec. 31, 1922	Johnson, Marshall, & Son.
Halibut	2,902	Jan. 15, 1921	Mar. 15, 1923	New England Fish Co.
Halibut	17,974	June 15, 1921	Mar. 15, 1923	New England Fish Co.
Halibut	31,157	July 10, 1921	Feb. 15, 1923	New England Fish Co.
Halibut	31,241	July 10, 1921	Feb. 15, 1923	New England Fish Co.
Halibut	31,380	July 15, 1921	Mar. 15, 1923	New England Fish Co.
Halibut	3,225	Sept. 10, 1921	Mar. 15, 1923	New England Fish Co.
Halibut	3,413	Sept. 10, 1921	Mar. 15, 1923	New England Fish Co.
Halibut	11,237	Sept. 10, 1921	Mar. 15, 1923	New England Fish Co.
Halibut	17,053	Sept. 10, 1921	Mar. 15, 1923	New England Fish Co.
Halibut	17,701	Sept. 10, 1921	Mar. 15, 1923	New England Fish Co.
Halibut	18,565	Sept. 10, 1921	Mar. 15, 1923	New England Fish Co.
Halibut	24,880	Sept. 10, 1921	Mar. 15, 1923	New England Fish Co.
Halibut	27,318	Sept. 10, 1921	Mar. 15, 1923	New England Fish Co.
Halibut	10,231	Oct. 25, 1921	Mar. 15, 1923	New England Fish Co.
Halibut	15,925	Oct. 25, 1921	Mar. 15, 1923	New England Fish Co.
Halibut	20,978	Oct. 25, 1921	Mar. 15, 1923	New England Fish Co.
Halibut	26,400	Oct. 25, 1921	Mar. 15, 1923	New England Fish Co.
Halibut	28,590	Oct. 25, 1921	Mar. 15, 1923	New England Fish Co.
Halibut	30,687	Oct. 25, 1921	Mar. 15, 1923	New England Fish Co.
Halibut	30,560	Nov. 15, 1921	Mar. 15, 1923	New England Fish Co.
Halibut	30,919	Nov. 15, 1921	Mar. 15, 1923	New England Fish Co.
Halibut	31,302	Nov. 15, 1921	Mar. 15, 1923	New England Fish Co.

TABLE NO. 10. — *Requests for Extension of Time granted on Goods in Cold Storage from December 1, 1921, to December 1, 1922 — Concluded.*

ARTICLE.	Weight (Pounds).	Placed in Storage.	Extension granted to —	Name.
Halibut	31,763	Nov. 15, 1921	Mar. 15, 1923	New England Fish Co.
Mackerel	250	Nov. 26, 1921	Jan. 26, 1923	Adams, J. A., Co.
Mackerel	2,640	Jan. 30, 1922 ¹	Nov. 1, 1922	Close, Henry T., Co.
Mackerel ²	2,210	Apr. 10, 1922	Jan. 1, 1923	Dorr, Arthur E., & Co., Inc.
Mackerel	1,440	July 21, 1921	Sept. 21, 1922	Draper, Louis A., Inc.
Mackerel	1,320	June 30, 1921	Nov. 1, 1922	Fearney, John T., & Son.
Mackerel ²	960	Feb. 22, 1922	Dec. 31, 1922	Interstate Fish Corporation.
Mackerel ²	4,000	Feb. 22, 1922	Dec. 31, 1922	Interstate Fish Corporation.
Mackerel ²	5,600	Feb. 22, 1922	Dec. 31, 1922	Interstate Fish Corporation.
Mackerel ²	12,720	Feb. 22, 1922	Dec. 31, 1922	Interstate Fish Corporation.
Mackerel	1,120	June 6, 1921	Sept. 6, 1922	Johnson, S. C.
Mackerel	1,120	Sept. 1, 1921	Nov. 1, 1922	Morse, Daniel J.
Mackerel	8,070	Apr. 1, 1922 ³	Dec. 1, 1922	O'Hara Brothers Co.
Pollock	500	Nov. 25, 1921	Dec. 25, 1922	Corso & Cannizzo.
Salmon	343	Aug. 12, 1921	Oct. 15, 1922	Atlantic & Pacific Fish Co.
Salmon	1,707	Aug. 18, 1921	Nov. 18, 1922	Gloucester Fresh Fish Co.
Salmon	2,697	Sept. 20, 1921	Dec. 20, 1922	Gloucester Fresh Fish Co.
Salmon	1,059	Apr. 20, 1921	Jan. 20, 1923	Prior & Townsend, Inc.
Salmon	400	May 24, 1921	July 4, 1922	Rawson's Market.
Smelts	175	Nov. 25, 1921	Dec. 25, 1922	Corso & Cannizzo Co.
Smelts	275	Sept. 26, 1921	Dec. 26, 1922	Russo & Sons.
Squid	1,853	May 21, 1921	Dec. 21, 1922	Busalacchi Brothers.
Squid	28,000	May 21, 1921	Dec. 21, 1922	Busalacchi Brothers.
Squid	12,000	May 23, 1921	Dec. 23, 1922	Busalacchi Brothers.
Squid	14,460	May 24, 1921	Dec. 24, 1922	Busalacchi Brothers.
Squid	19,260	May 25, 1921	Dec. 25, 1922	Busalacchi Brothers.
Squid	14,640	May 26, 1921	Dec. 26, 1922	Busalacchi Brothers.
Squid	25,380	May 28, 1921	Dec. 28, 1922	Busalacchi Brothers.
Squid	33,780	May 31, 1922	Dec. 31, 1922	Busalacchi Brothers.
Squid	8,300	June 7, 1921	Dec. 7, 1922	Busalacchi Brothers.
Squid	4,305	June 8, 1921	Dec. 8, 1922	Busalacchi Brothers.
Squid	37,000	June, 1921	Dec. 1, 1922	North Truro Cold Storage Co.
Whiting	425,814	June 15, 1920	Dec. 15, 1921	Interstate Fish Corporation.

¹ Originally stored in Canada.² Bait.³ Previously stored in Portland.TABLE NO. 11. — *Requests for Extension of Time not granted on Goods in Cold Storage from December 1, 1921, to December 1, 1922.*

ARTICLE.	Weight (Pounds).	Placed in Storage.	Name.
Butter	2,744	Jan. 13, 1921	Drake Brothers Co.
Beef	3,422	Feb. 12, 1921	Swift, E. C., & Co.
Beef	8,179	Feb. 19, 1921	Swift, E. C., & Co.
Beef	1,088	Oct. 10, 1921	Swift, E. C., & Co.
Beef	1,054	Oct. 14, 1921	Swift, E. C., & Co.
Beef chucks	1,766	Feb. 11, 1921	Swift, E. C., & Co.
Beef chucks	7,303	Feb. 12, 1921	Swift, E. C., & Co.
Beef loins	408	Feb. 12, 1921	Swift, E. C., & Co.
Beef loins	2,940	Feb. 12, 1921	Swift, E. C., & Co.
Beef loins	4,347	Feb. 15, 1921	Swift, E. C., & Co.
Beef loins	7,250	Feb. 16, 1921	Swift, E. C., & Co.
Beef ribs	901	Feb. 3, 1921	Swift, E. C., & Co.
Beef ribs	1,582	Feb. 3, 1921	Swift, E. C., & Co.
Beef ribs	4,248	Feb. 3, 1921	Swift, E. C., & Co.
Beef ribs	2,410	Feb. 4, 1921	Swift, E. C., & Co.
Beef ribs	2,268	Feb. 8, 1922	Swift, E. C., & Co.
Beef ribs	497	Feb. 9, 1921	Swift, E. C., & Co.
Beef ribs	889	Feb. 10, 1921	Swift, E. C., & Co.
Beef ribs	770	Feb. 11, 1921	Swift, E. C., & Co.
Beef ribs	774	Feb. 16, 1921	Swift, E. C., & Co.
Beef ribs	903	Feb. 18, 1921	Swift, E. C., & Co.
Beef rumps	13,000	Feb. 2, 1921	Swift, E. C., & Co.
Beef rumps	5,571	Feb. 3, 1921	Swift, E. C., & Co.
Beef rumps	828	Feb. 8, 1921	Swift, E. C., & Co.
Beef shoulder clods	109	Oct. 6, 1920	Squire, John P., & Co.

TABLE No. 11. — *Requests for Extension of Time not granted on Goods in Cold Storage from December 1, 1921, to December 1, 1922 — Continued.*

ARTICLE.	Weight (Pounds).	Placed in Storage.	Name.
Beef shoulder clods	327	Oct. 9, 1920	Squire, John P., & Co.
Beef shoulder clods	109	Oct. 14, 1920	Squire, John P., & Co.
Beef shoulder clods	218	Oct. 15, 1920	Squire, John P., & Co.
Beef shoulder clods	545	Oct. 17, 1920	Squire, John P., & Co.
Beef shoulder clods	545	Oct. 18, 1920	Squire, John P., & Co.
Beef shoulder clods	654	Oct. 20, 1920	Squire, John P., & Co.
Beef shoulder clods	109	Oct. 22, 1920	Squire, John P., & Co.
Beef shoulder clods	218	Oct. 23, 1920	Squire, John P., & Co.
Beef shoulder clods	545	Oct. 27, 1920	Squire, John P., & Co.
Beef shoulder clods	763	Oct. 29, 1920	Squire, John P., & Co.
Beef shoulder clods	109	Oct. 30, 1920	Squire, John P., & Co.
Beef shoulder clods	109	Nov. 3, 1920	Squire, John P., & Co.
Beef shoulder clods	872	Nov. 4, 1920	Squire, John P., & Co.
Beef shoulder clods	545	Nov. 8, 1920	Squire, John P., & Co.
Beef shoulder clods	1,090	Nov. 11, 1920	Squire, John P., & Co.
Beef shoulder clods	327	Nov. 14, 1920	Squire, John P., & Co.
Beef shoulder clods	218	Nov. 15, 1920	Squire, John P., & Co.
Beef shoulder clods	327	Nov. 16, 1920	Squire, John P., & Co.
Beef shoulder clods	654	Nov. 17, 1920	Squire, John P., & Co.
Beef shoulder clods	227	Nov. 18, 1920	Squire, John P., & Co.
Beef shoulder clods	1,308	Nov. 20, 1920	Squire, John P., & Co.
Beef shoulder clods	109	Nov. 23, 1920	Squire, John P., & Co.
Beef shoulder clods	763	Nov. 24, 1920	Squire, John P., & Co.
Beef shoulder clods	981	Nov. 26, 1920	Squire, John P., & Co.
Lamb legs	2,282	Jan. 21, 1921	Dorr, Arthur E., & Co., Inc.
Pork	5,010	Dec. 17, 1920	Furneau, Henry J.
Pork loins	6,100	May 21, 1921	Independent Beef & Provision Co.
Ciscoes	26,000	Apr. 13, 1921	Rutstein, B., & Sons.
Lobster meat	49	May 10, 1921	Hammond, J. W., Co.
Lobster meat	49	May 17, 1921	Hammond, J. W., Co.
Lobster meat	70	May 24, 1921	Hammond, J. W., Co.
Shrimp	400	Dec. 28, 1920	Corso & Cannizzo.

TABLE No. 12. — *Requests granted for Permission to remove Articles which had been in Cold Storage Longer than Twelve Months from December 1, 1921, to December 1, 1922.*

ARTICLE.	Weight (Pounds).	Placed in Storage.	Name.
Butter	120	May 26, 1921	Fowle, Hibbard Co.
Butter	7,035	—	Lewis, Mears Co.

TABLE No. 13. — *Articles which had been in Cold Storage Longer than Twelve Months, and on which No Requests for Extension had been made, ordered removed, from December 1, 1921, to December 1, 1922.*

ARTICLE.	Weight (Pounds).	Placed in Storage.	Name.
Egg whites	1,290	May 9, 1921	Lewis, Mears Co.
Egg whites	900	May 25, 1921	Swift, E. C., & Co.
Butter	19,110	Feb. 18, 1921	Lepman & Co.
Butter	68	June 7, 1921	Miller, E. L.
Butter	360	Oct. 26, 1921	Thornton, J. C.
Butter	300	Oct. 26, 1921	Thornton, J. C.
Broilers	37	Dec. 3, 1920	Genoa Café.
Broilers	58	Dec. 9, 1920	Genoa Café.
Broilers	120	Jan. 6, 1921	Genoa Café.
Broilers	528	Apr. 26, 1921	Allen, Robert.

TABLE NO. 13. — *Articles which had been in Cold Storage Longer than Twelve Months, and on which No Requests for Extension had been made, ordered removed, from December 1, 1921, to December 1, 1922. — Continued.*

ARTICLE.	Weight (Pounds).	Placed in Storage.	Name.
Broilers	225	Aug. 27, 1921	Armour & Co.
Chickens	54	Nov. 20, 1920	McCabe, M. J.
Chickens	294	Nov. 27, 1920	Genoa Café.
Chickens	25	Dec. 3, 1920	Bowker, George.
Chickens	25	Dec. 6, 1920	McGauley, O. F.
Chickens	30	Dec. 30, 1920	Genoa Café.
Chickens	138	Dec. 30, 1920	Genoa Café.
Chickens	384	Dec. 7, 1920	Genoa Café.
Chickens	43	Jan. 3, 1921	Sousa, J. F.
Chickens	90	Aug. 27, 1921	Blackstone Supply Co.
Ducks	35	Dec. 30, 1920	Genoa Café.
Fowl	150	Dec. 4, 1920	Alley, Green & Pipe.
Fowl	874	Mar. 23, 1921	Blackstone Supply Co.
Geese	252	Nov. 2, 1920	Genoa Café.
Geese	50	Jan. 10, 1921	King's Public Market.
Roasters	132	Mar. 12, 1921	Lackett, C. J.
Roasters	173	Mar. 19, 1921	Strong, Marson Co.
Turkeys	267	Nov. 30, 1920	Dorr, Arthur E., & Co., Inc.
Turkeys	-	-	Sousa, J. F.
Deer	217	Nov. 22, 1920	Storr, Dr. L. A.
Reindeer	44	-	Batchelder & Snyder Co.
Reindeer	64	-	Batchelder & Snyder Co.
Reindeer fores	187	-	Batchelder & Snyder Co.
Reindeer fores	414	-	Batchelder & Snyder Co.
Reindeer loins	194	-	Batchelder & Snyder Co.
Reindeer racks	79	-	Batchelder & Snyder Co.
Reindeer racks	98	-	Batchelder & Snyder Co.
Venison	27	Nov. 30, 1920	Mixter, Dr. S. J.
Venison	100	Dec. 4, 1920	Russell, F. B.
Venison	60	Dec. 7, 1920	Russell, F. B.
Beef	500	Oct. 5, 1921	Blackstone Supply Co.
Beef	1,162	Oct. 15, 1921	Blackstone Supply Co.
Beef	1,079	Oct. 28, 1921	Blackstone Supply Co.
Beef	7,987	Nov. 2, 1921	Blackstone Supply Co.
Beef	790	Dec. 2, 1920	Brighton Dressed Meat & Wool Co.
Beef	751	Feb. 16, 1921	Brighton Dressed Meat & Wool Co.
Beef	2,423	Dec. 9, 1920	Katz, Phillip.
Beef	86	Apr. 1, 1921	Knott, J. R.
Beef	23	Feb. 1, 1921	Lunt, Joseph.
Beef	673	May 3, 1921	Mindick, M.
Beef	370	May 9, 1921	Mindick, M.
Beef	621	-	Mindick, M.
Beef	600	Sept. 9, 1921	Neck Market Co.
Beef	90	July 11, 1921	Sousa, John F.
Beef	500	Aug. 26, 1921	Stern, B. S.
Beef	850	Feb. 26, 1921	Swift, E. C., & Co.
Beef	668	Mar. 1, 1921	Swift, E. C., & Co.
Beef	498	Mar. 3, 1921	Swift, E. C., & Co.
Beef	290	Mar. 8, 1921	Swift, E. C., & Co.
Beef	2,354	Mar. 9, 1921	Swift, E. C., & Co.
Beef	2,079	Mar. 10, 1921	Swift, E. C., & Co.
Beef	1,740	Mar. 11, 1921	Swift, E. C., & Co.
Beef	605	Mar. 12, 1921	Swift, E. C., & Co.
Beef	446	Mar. 14, 1921	Swift, E. C., & Co.
Beef	220	Mar. 19, 1921	Swift, E. C., & Co.
Beef	785	Mar. 22, 1921	Swift, E. C., & Co.
Beef	558	Mar. 23, 1921	Swift, E. C., & Co.
Beef	243	Mar. 24, 1921	Swift, E. C., & Co.
Beef	1,130	Mar. 24, 1921	Swift, E. C., & Co.
Beef	100	Mar. 27, 1921	Swift, E. C., & Co.
Beef	1,528	Mar. 27, 1921	Swift, E. C., & Co.
Beef	461	Mar. 28, 1921	Swift, E. C., & Co.
Beef	1,023	Mar. 29, 1921	Swift, E. C., & Co.
Beef	251	Mar. 30, 1921	Swift, E. C., & Co.
Beef	452	Mar. 30, 1921	Swift, E. C., & Co.
Beef	1,184	Apr. 8, 1921	Swift, E. C., & Co.
Beef	939	Apr. 11, 1921	Swift, E. C., & Co.
Beef	3,000	Oct. 3, 1920	Wheeler, T. H., Co.
Beef butts	2,500	Sept. 25, 1920	Strong, Marson Co.
Beef butts	-	Apr. 5, 1921	Wheeler, T. H., Co.
Beef chucks	72	Mar. 19, 1921	Swift, E. C., & Co.
Beef head meat	1,614	Jan. 24, 1921	Brighton Dressed Meat & Wool Co.
Beef kidneys	104	Mar. 21, 1921	Swift, E. C., & Co.

TABLE No. 13. — *Articles which had been in Cold Storage Longer than Twelve Months, and on which No Requests for Extension had been made, ordered removed, from December 1, 1921, to December 1, 1922 — Concluded.*

ARTICLE.	Weight (Pounds).	Placed in Storage.	Name.
Beef ribs	1,615	July 25, 1921	Swift, E. C., & Co.
Beef shoulder clods	1,612	Feb. 3, 1921	Currier, R. I.
Beef shoulder clods	19,000	Nov. 8, 1920	Handy, H. L.
Beef shoulder clods	25,000	Oct., 1920	Handy, H. L.
Beef shoulder clods	1,617	Feb. 3, 1921	Jensen, Peter.
Beef shoulder clods	2,100	Feb. 3, 1921	King, J. R.
Beef shoulder clods	533	Feb. 3, 1921	O'Donnell, J. M.
Beef shoulder clods	1,610	Feb. 3, 1921	Tarasza, C.
Beef strips	1,047	Oct. 12, 1920	Armour & Co.
Beef trimmings	1,094	June 18, 1921	Mindick, M.
Beef trimmings	2,707	July 29, 1921	Mindick, M.
Mutton	355	Oct. 31, 1921	Blackstone Supply Co.
Mutton	2,024	Nov. 2, 1921	Libby & Libby Co.
Oxtails	2,175	Sept. 19, 1920	Eastwood, Albert.
Pork	202	Aug. 13, 1921	Cornelier, J. N.
Pork	60	July 22, 1921	Goldman, Abraham.
Pork	67	Nov. 5, 1920	Kirby, Dr. H. C.
Pork butts	1,820	Dec. 30, 1920	Stern, B. S.
Pork rinds	234	Sept. 13, 1921	Henderson, Henry.
Pork rinds	224	Sept. 17, 1921	Henderson, Henry.
Pork trimmings	50	Dec. 1, 1920	Dold, Jacob, Co.
Pigs' kidneys	180	Jan. 24, 1921	Burke, J. C., Co.
Pigs' hocks	568	Oct. 20, 1921	Cavanaugh, W. H.
Pigs' hocks	517	Oct. 20, 1921	Cavanaugh, W. H.
Pigs' hocks	160	Oct. 28, 1921	Cavanaugh, W. H.
Pigs' hocks	542	Oct. 28, 1921	Cavanaugh, W. H.
Spare ribs	60	Mar. 26, 1921	Cavanaugh, W. H.
Veal	138	June 22, 1921	Turco, George.
Veal	90	Apr. 29, 1921	Stodar, R.
Veal legs	75	Dec. 11, 1920	Strong, Marson Co.
Head cheese	130	July 31, 1921	Blackstone Supply Co.
Head cheese	328	July 31, 1921	Blackstone Supply Co.
Head cheese	378	Aug. 13, 1921	Blackstone Supply Co.
Eels	280	June 1, 1921	Mantia, S.
Eels	210	June 9, 1921	Mantia, S.
Eels	280	June 13, 1921	Mantia, S.
Eels	555	June 15, 1921	Mantia, S.
Eels	105	June 20, 1921	Mantia, S.
Eels	245	Dec. 28, 1921	Connazzio, Frank.
Lobster meat	60	Dec. 3, 1920	Union Lobster Co.
Lobster meat	48	Dec. 6, 1920	Union Lobster Co.
Lobster meat	29	Jan. 7, 1921	Union Lobster Co.
Lobster meat	15	Jan. 12, 1921	Union Lobster Co.
Lobster meat	20	Jan. 12, 1921	Union Lobster Co.
Mackerel	1,120	July 18, 1921	Bay Fish Co.
Mackerel	1,253	Sept. 6, 1921	Colonial Fisheries Co.
Mackerel	140	Dec. 9, 1921	Gove & Mollins.
Scallops	80	Dec. 24, 1920	Poole, J. R., & Co.
Scup	2,240	Jan. 10, 1921	Russo & Sons.
Shark	275	July 5, 1921	Globe Fish Co.
Shark	800	Aug. 10, 1920	Russo & Sons.
Shrimp	400	Dec. 28, 1920	Corso & Cannizzo.
Shrimp	100	Dec. 1, 1920	Globe Fish Co.
Skatefish	140	June 20, 1921	Mantia, S.
Squid	175	May 23, 1921	Sardina, Joseph.
Whiting	1,048	May 28, 1921	Mantia, S.
Whiting	643	May 29, 1921	Mantia, S.
Whiting	390	May 20, 1921	Russo & Sons.

REPORT OF DIVISION OF COMMUNICABLE DISEASES.

The most outstanding feature of the year is the remarkable freedom from epidemic disease. A distinct decrease in the reported incidence over that of 1921 is noted in anterior poliomyelitis, chicken pox, diphtheria, ophthalmia neonatorum, scarlet fever, septic sore throat, smallpox, typhoid fever, pulmonary tuberculosis, gonorrhea and syphilis; while an increase is to be seen in the reported incidence of dog bite (requiring antirabic treatment), dysentery, encephalitis lethargica, influenza, measles, mumps, lobar pneumonia, and whooping cough. But for the high incidence of influenza in February and March with the subsequent high incidence of lobar pneumonia and the increase in measles, a substantial reduction in our total reported incidence would have been noted. The mortality rate for nearly all of the reportable diseases shows an appreciable decline from that of last year.

High endemic incidence, however, for certain of these diseases has been consistently noted in many communities. This leads one to wonder if perchance we are not faltering a bit in our campaign for the control of these preventable diseases.

One cannot help but feel that if public opinion was duly aroused by the continued incidence of the disease, as it would be if this incidence was considered epidemic, far greater results for prevention and control would be obtained. It was, of course, but natural when great devastating outbreaks were to be expected that the plans devised for their prevention and control would be of the larger scope necessary to meet the conditions which are attendant upon large outbreaks. Today one recalls the excitement, the tremendous amount of energy, and the large sums of money which such epidemics called forth. It further may be remembered that one of the first questions to be decided was whether or not the number of infections warranted the health departments in setting into motion their machinery for the control of outbreaks. Because of this attitude little or no effort was expended, or procedure instituted, for the care of the sporadic case, and we find ourselves today in the position of waiting until the infection is of sufficient importance to necessitate our action.

Retrospection points out unmistakably instance after instance where the infection continued to grow awaiting energetic action, and it does appear that had effective preventive measures been applied to the sporadic case, as would have been deemed necessary had epidemic conditions prevailed, continued incidence would have been avoided. The importance of this fact is further emphasized when one realizes that nearly all endemic conditions have had their origin and being in the improperly treated sporadic case.

Furthermore, many of the causes of endemic conditions, such as the missed case, the undiagnosed case, the unreported case, the absence or lax enforcement of quarantine, in the face of greater activity on our part would be removed. It is inconceivable that householders would hesitate to call a physician in what appears to be a mild case of communicable disease if they realized that from this mild infection an outbreak in the community is possible, nor would the undiagnosed case be as frequent if physicians had in mind not only the atypical forms with the milder symptoms but also the necessity of isolation of patient until diagnosis had been definitely established. The proof that this contention is true may be found in the experience of communities that have become aroused by the continued high incidence of a given communicable disease, and who have intensively employed measures of known value for controlling and preventing infection.

As an illustration of this, a scarlet fever outbreak in a community of about 8,000 people may be mentioned. There were 48 cases reported during nine months of the year, and 40 cases were reported in October and November. Investigation showed that this condition was largely due to contact infection resulting from unreported cases, failure to enforce quarantine, unrecognized cases in the school, little or no precautions used in the returning of milk bottles, and the fact that families had not been instructed in most instances relative to the isolation of cases. There was evidence of marked delay in the reporting of cases by physicians as well as instances of no reporting at all. This community became aroused and sought an investigation. The local board of health adopted stringent rules and regulations, copies of which were mailed to each physician, and it was further provided that families should receive instructions regarding the necessary precautions to be observed emphasizing that quarantine meant much more than tacking a card upon a house. As a result of this intensive effort, a sharp decrease in the incidence was immediately noted. It is, of course, obvious that if one were to substitute smallpox for scarlet fever, no such apathy would be entertained or even tolerated by the citizens.

Oftentimes both the cause and effect of endemic conditions are due to the secondary infections found within households or in neighborhoods. For the past year a separate name and address file has been kept for cases of diphtheria reported to show the importance of this problem and, furthermore, to demonstrate that communities showing an undue number of secondary infections would also show an undue incidence. That this has been proven is shown by the following tables:—

Secondary Cases of Diphtheria occurring within the Same Household or at the Same Address, 1922.

CITY OR TOWN.	Total Cases, 1922.	Endemic Index.	Primary Cases.	Secondary Cases.
<i>District No. 1.</i>				
ATTLEBORO	11	27	1	3
Barnstable	4	—	1	1
Edgartown	3	—	1	1
Fairhaven	29	5	3	4
FALL RIVER	330	211	24	31
Mansfield	10	1	1	3
Marion	15	—	1	5
Middleborough	3	3	1	2
NEW BEDFORD	309	146	20	27
Sandwich	5	—	1	2
Somerset	15	1	1	5
TAUNTON	24	39	1	1
<i>District No. 2.</i>				
Braintree	16	12	2	2
Bridgewater	14	5	2	2
BROCKTON	372	105	43	81
Brookline	82	43	5	7
CAMBRIDGE	205	285	16	22
Canton	12	9	2	4
Framingham	19	13	2	2
Hull	7	—	1	1
MARLBOROUGH	19	11	2	2
Milton	8	5	1	1
NEWTON	63	90	5	5
Norwood	23	6	3	6
QUINCY	95	97	14	22
Wellesley	14	22	1	1
<i>District No. 3.</i>				
Amesbury	23	17	4	4
BEVERLY	46	8	4	5
CHELSEA	116	96	14	18
Danvers	50	17	6	23
Danvers State Hospital	—	—		
EVERETT	99	140	7	15
GLOUCESTER	37	20	2	2
HAVERHILL	152	157	10	14
Ipswich	28	4	2	2
LYNN	244	265	13	16
MALDEN	145	150	20	29

Secondary Cases of Diphtheria occurring within the Same Household or at the Same Address, 1922—Concluded.

CITY OR TOWN.	Total Cases, 1922.	Endemic Index.	Primary Cases.	Secondary Cases.
<i>District No. 3—Con.</i>				
Manchester	2	—	1	1
Marblehead	21	3	1	5
MELROSE	16	38	3	5
NEWBURYPORT	6	12	1	1
PEABODY	109	21	15	30
REVERE	72	87	5	6
SALEM	87	72	4	6
Stoneham	29	8	1	2
Wakefield	43	22	7	8
West Newbury	21	—	1	1
Winthrop	9	10	1	1
<i>District No. 4.</i>				
Andover	17	10	2	3
Arlington	44	25	5	9
Belmont	12	15	1	4
Billerica	9	1	1	1
LAWRENCE	112	136	9	10
Littleton	4	—	1	1
LOWELL	215	262	10	11
MEDFORD	56	63	4	4
SOMERVILLE	175	220	13	18
WALTHAM	99	60	5	10
Watertown	100	43	9	9
WOBURN	39	18	8	12
<i>District No. 5.</i>				
Dudley	6	2	1	1
East Brookfield	2	—	1	1
FITCHBURG	130	71	12	13
Gardner	39	19	3	4
LEOMINSTER	20	19	2	2
Millbury	6	1	2	2
North Brookfield	9	—	1	1
Oxford	7	—	1	6
Southbridge	20	5	1	1
Templeton	9	3	1	1
Warren	4	—	1	1
WORCESTER	352	315	37	55
<i>District No. 6.</i>				
Amherst	9	2	2	2
CHICOPEE	81	66	5	7
Easthampton	40	35	2	2
Hatfield	34	1	1	1
HOLYOKE	142	43	12	17
Ludlow	25	4	2	2
NORTHAMPTON	26	28	3	4
Palmer	27	11	1	1
SPRINGFIELD	165	193	14	17
Ware	64	1	3	5
WESTFIELD	58	40	6	12
West Springfield	28	13	3	4
<i>District No. 7.</i>				
Adams	54	14	2	3
Dalton	16	—	4	10
Erving	13	—	1	1
Montague	47	4	4	5
Orange	23	4	3	4
PITTSFIELD	82	26	5	5
Shelburne	2	—	1	1

Summary of Secondary Infections, Diphtheria, 1922.

	Cases.
Same family name	978
Same street address	1,206
Secondary cases reported later than original report:	
Same day	237
1 day	50
2 days	63
3 days	42
4 days	36
5 days	24
6 days	24
7 days	35
8 days	28
9 days	17
10 days	23
11 days	17
12 days	12
13 days	9
14 days	17
15 days	10
16 days	12
17 days	9
18 days	6
19 days	8
20 days	4
21-30 days	64
Over 30 days	157
Age distribution:	
Under 1 year	16
1 year	40
2 years	72
3 years	80
4 years	101
5-6 years	199
7 years	84
8 years	77
9 years	57
10 years	50
11-15 years	154
16-20 years	35
21-25 years	27
26-30 years	22
31-40 years	28
41-50 years	17
Over 50 years	3
Not given	144

Reviewing these figures one cannot help but feel that with infections occurring one after another in the same family, with the days of onset of succeeding cases sufficiently far apart to have had preventive measures effective, the best principles of public health procedure have not been followed. Nor does one review successive multiple cases within a given neighborhood without realizing the lack of effort to seek early knowledge of the possibility of infection among playmates through direct contact with the initial case, or with other known or unrecognized cases. Surely, under epidemic conditions with the present armamentarium available which would be called into action, the control of the conditions could be secured in the beginning and further infections prevented.

In conclusion, it appears that the treatment of the sporadic or the initial case with the same energy, the same initiative, and using the identical agencies as would be applied to a condition generally dreaded as epidemic by our people, would produce the same results at very great savings of life, time, money and disturbance of the routine habits of our existence, and we are led, therefore, to the query of whether or not a program based largely upon epidemic traditions, which fosters a spirit of delay until conditions warrant strenuous activities, is not in truth largely responsible for endemic conditions existing today.

I. CERTAIN DISEASES DESERVING SPECIAL MENTION.

A. *Smallpox*, once the scourge of our State, was reported in but two instances, both cases being of a mild type of infection and both uneventfully recovered. The first case, reported in June, was in a man 70 years of age who had but recently come from Phoenix, Arizona, where smallpox had been present. He gave a history of having been vaccinated in childhood and again in 1911. There was no scar as evidence of his vaccinations. All persons in immediate contact with the patient, eight in number, were vaccinated and no further cases developed.

The second case in a child $3\frac{1}{2}$ years was reported in November. There exists some doubt as to the diagnosis in this case. The child is said to have been on a farm for four weeks during which time no visitors had been received and no chance for outside contact. The history is that in the latter part of October the child was taken ill with vomiting and high temperature (104°). On the evening of the third day an eruption appeared upon the abdomen which continued in successive crops showing few vesicles and papules. Temperature was of continuing type and two days later the eruption was in full stage of development. On abatement there were a few vesicles and papules on forearm and pustules on neck at hair line; face, hands, legs and feet were free from eruption. The consultants differed in opinion as to diagnosis being a mild smallpox or a severe chicken pox. All precautions for the prevention of the spread of smallpox were taken, however, the inmates of the household vaccinated and the entire school population in the community vaccinated and revaccination for those who needed it. No further cases were reported.

B. *Ophthalmia Neonatorum*. — Of special interest is the continued freedom of serious defects arising from ophthalmia neonatorum. There has not been a single case of blindness reported during the year resulting from this condition in a child who lived. This splendid result is especially emphasized by a review of the results of ten years ago when 22 cases of blindness, or instances where vision was very seriously impaired, were reported. There has been a decrease of over 40% in the reported incidence of the disease over that reported in 1917. We have, therefore, cause for feeling that very definite achievement has been made and that this has resulted not alone through the free distribution of the 1% solution of silver nitrate to physicians of the state by this Department to use as a prophylactic in cleansing the eyes of the new born, but also through the splendid cooperation of the local boards of health in providing expert care and treatment for the reported cases and through the work of the Massachusetts Division of the Blind who have helped tremendously in the follow-up work and in educational activities with ever sustaining interest.

C. *Diphtheria prevention* continues to assume the foremost place in our activities. Never before has there been so widespread an interest in preventing this disease. The calls for Schick demonstrations continue without abatement and we find evidence that the physicians are introducing this measure into their private practices much more frequently than in past years.

The most notable campaign that has been inaugurated this year is that of the Boston Health Department. Early in the year the Boston Health Commissioner, Dr. Francis X. Mahoney, outlined a most comprehensive program and has already, through the able and energetic assistance of his medical staff, Schicked and immunized a large group of children in the parochial schools of Boston, and through clinics established at the various hospitals and health centers has reached a large number of children of the pre-school age group.

Quite as notable but not affecting so many children was the toxin-antitoxin work carried on by the Northampton Board of Health in February. Here approximately 4,500 children were immunized against diphtheria. Nearly all of this number were children of the school age group and a small number in the pre-school age group. Of the six infections reported since August, two were under school age and one was well over school age, being 35, leaving but three children of school age, two of whom were not immunized and the third had received but one injection. This community

was the first in the state to institute a toxin-antitoxin campaign without first Schick testing its children for susceptibles. The reason for this procedure in this particular instance was that a neighboring community on being Schick tested showed an abnormally high group of positive reactors, and it appeared to the local authorities that it was best to give the immunization without the Schick test because they believed that their percentage of susceptibles would be almost as high. Provided a community will re-Schick six months after the completion of the immunization to be sure that it may not be dwelling with a false sense of security and, furthermore, immunize the small group of approximately 10% which will not develop an immunity in the three injections, this Department has no objection to this procedure being followed out.

The clinics established two or more years ago at Lynn and Newton are continuing their work with unabated interest. Since this work was inaugurated the following communities have had Schick demonstrations and are continuing the work faithfully: Arlington, Barnstable, Boston, Bourne, Brockton, Cambridge, Danvers, Framingham, Hadley, Haverhill, Hingham, Lawrence, Lowell, Lynn, New Bedford, Newton, North Adams, Northampton, Quincy, Pittsfield, Plymouth, Scituate, Templeton, Tewksbury, Waltham, Westwood, Williamsburg, Winchendon, Woburn and Wrentham.

Insofar as our records show there has not been a death from diphtheria in a person who has shown a negative Schick test, or in a person who has been immunized by three injections of toxin-antitoxin mixture. Furthermore, there has been no discomfort or illness following immunization in any child under 15 years of age who has shown a frankly positive reaction. In the older groups, that is from 16 on, we have noted an occasional local reaction of more or less severity in those persons who show a susceptibility to bacterial protein, giving a combined reaction. There has been no serious or harmful result from the use of the Schick test or the toxin-antitoxin mixture. There has been an occasional slight constitutional reaction in those persons who possess a hyper-susceptibility. The increased interest and application of these methods have already given evidence that diphtheria will be controlled at no distant date. Our death rate (14.8) is one of the lowest in our history. Not since 1912 has the death rate per 100,000 population been below 15.3.

D. *Typhoid fever* with 694 cases shows the lowest number ever reported in one year in this State. The steady decline from the reported incidence of 3,452 in 1910 is indeed most satisfactory. It is of interest to note that of these 694 cases, 60 were due to contact with another person who had been ill, 6 were definitely traced to carriers, 6 to food, 10 to infected milk, 5 to water, 607 unknown or no history. There were 4 carriers definitely proven to be harboring and excreting typhoid bacilli. One of these carriers, a milk man, caused 7 cases in 1922, 3 in 1921, and 10 in 1919.

E. *Whooping Cough and Measles* both continue to cause many deaths among the young children and both showed an increase in incidence over that reported for the preceding year.

F. *Pulmonary Tuberculosis* shows an increasing decline in reported incidence and a lowered mortality as well. Were we sure that this decline might be taken as a decrease in actual incidence, our gratification would be greater. However, even though we know there yet remain many cases unreported, it is fair to assume that the percentage of non-reporting is no greater today than in years gone by and that we, therefore, are experiencing a definite decline in the infection.

Great hope is entertained that the consultation clinic and the examination clinic will bring to light many cases which might be classified as early or incipient tuberculosis and which may be benefited by the treatment furnished in state, county, and municipal sanatoria.

G. *Dog Bite*. — The number of persons bitten by rabid dogs shows a marked increase over the past year (approximately 38%). The total number of examinations made upon dogs' heads to determine whether they showed the Negri bodies and were affected with rabies reached the unequalled total of 477. The time has arrived for much more strenuous activity to prevent this condition through drastic quarantine measures exercised by local authorities.

II. FIELD FORCE.

The absence of outbreaks during the year has given the District Health Officers more time to work upon constructive programs than has been possible in past years. Notable among these is the school nurse program. The Legislature of 1921 passed an Act making it mandatory for communities of the state having a million dollar or more valuation to have a school nurse, either alone or in combination with the school departments of other towns. A great deal of time has been allotted to this activity and many conferences have been necessary but the results have well warranted the effort and there is scarcely a community without a school nurse, if of size to warrant her employment. The splendid cooperation of all interested in this movement, the State Department of Education, the local authorities and our citizens, alone has made this achievement possible, and should henceforth stand forth as a shining example of what may be done by cooperative effort.

Another activity has been the development of the consultation clinic for the diagnosis of the doubtful case of tuberculosis, and the examination clinic for children who are 10% or more underweight. The splendid enthusiasm of our Nursing Assistants with both the local authorities and the extra governmental agencies bids fair to result in a new milestone in our tuberculosis campaign. The interested sanatoria staff has made these two activities possible and only the limitation of time and strength prevents the extension of this work.

The usual inspections of jails, lock-ups, houses of correction, etc., have been made. The need for such inspection appears to be less than formerly, for with the better transportation through the use of the automobile the small towns are rapidly giving up their lock-ups and moving their prisoners to larger centers. This, together with the fact that little or no attention has been paid to our recommendations for certain improvements mainly because they always call for an expenditure of money, lead us to suggest that the field force be relieved of this duty.

In accordance with the provisions of Section 55, Chapter 111 of the General Laws, 80 dispensaries were inspected and approved by the field force. There has been a distinct increase in the whole tone of dispensary operation and there is not a licensed dispensary operating today in Massachusetts but what is doing a most beneficial work. This is in marked contrast to the condition existing a few years ago when several dispensaries were operating at least on the border line of quackery or charlatanism.

The fifty-four tuberculosis dispensaries have been visited by the District Health Officers during the year. A new dispensary has been established in Arlington. No great improvement over the conditions existing in the past year has been noted. Inasmuch as these dispensaries were to be studied by a special committee considering the whole subject of pulmonary tuberculosis by Legislative order, no action has been taken or recommendations made.

Consultations with physicians and with boards of health continue to increase in number and are productive of much good. More and more are we in receipt of requests for differential diagnosis of communicable disease. This particular form of District Health Officer activity presents to my mind the greatest opportunity of setting forth correct public health knowledge because after all it is the local people, the physicians and health authorities alike, who are the natural leaders in local progress in health matters.

Every board of health of the state has been visited and the larger ones many times. A very large amount of time has been expended in the continuation of the Schick program with demonstrations and lectures. The momentum that this program has reached will remain in the foreground of our activities for years to come. This, of course, is desirable for it is the one public health activity which not only promises such a definite saving of life, but which may act as an index of interest and activity for the local authorities.

In reviewing the year's activities, it is noted that the entire field force are agreed that there is an urgent need for more frequent conferences with the workers and

citizens of their respective districts. It is their opinion that many of the difficulties arise from insufficient and incorrect information on the part of these groups who are truly interested in public health work. Dr. Dudley is particularly desirous of having a Health Council for each district, where the entire personnel of the various agencies engaged in public health work may meet, through representation, and discuss plans for individual district activity. This should result in lessening the instances of duplication and should furnish an important group of workers with whom the State's program may be discussed, and with the better feeling which results from more intimate acquaintance, a more concerted effort would be procured.

A new activity was undertaken this past year for the Connecticut Valley District. Through arrangement with the Westinghouse Electric Company, the radio program issued on Wednesday nights has been placed in charge of Dr. Miner, District Health Officer for the Connecticut Valley District. The importance of this educational activity is clearly apparent, and its far-reaching effect is only limited by the number of people who own radio receiving outfits. Not of the least importance is the fact that by this arrangement only sound public health medical knowledge is disseminated and that propaganda for the spread of unsound movements may be eliminated.

Camp Regulations.

Because of the rapidly increasing automobile camps and the lack of sanitary regulations to protect our communities from possible infection, the following regulations were prepared for adoption of the communities that have, or are likely to have, difficulty from these sources:—

PROPOSED MINIMUM REGULATIONS FOR THE SANITARY CONTROL OF AUTOMOBILE CAMPS.

Approval of Location.

1. No public automobile camp shall be established until the location thereof shall have been approved by the board of health of the city or town in which the camp is to be located.

Permits for Camps on Watersheds of Public Water Supplies.

2. No permit shall be granted for a public automobile camp on the watershed of any public water supply until proper sanitary facilities have been provided which shall not be in violation of the rules and regulations for the sanitary protection of public water supplies as established by the State Department of Public Health.

Water Supply.

3. Every public automobile camp shall be provided with a water supply of good sanitary quality and of sufficient quantity. Any well or spring of poor or questionable quality available at such public automobile camps shall be removed or posted as unsafe. Proper pumps or overflow pipes shall be provided for the removal of water from any well or spring used for a water supply at a public automobile camp and such wells or springs shall be protected from pollution.

Sewage Disposal.

4. Each public automobile camp so located that public sewerage facilities are available shall be provided with suitable flush toilets, and every public automobile camp not so located that public sewerage facilities are available shall be provided with suitable fly-proof privies which shall be maintained in a clean and sanitary condition.

Disposal of Garbage, etc.

5. Each public automobile camp shall be provided with tight covered receptacles for rubbish, garbage and refuse, and all rubbish, garbage and refuse including waste papers, bottles and tin cans shall be deposited in said receptacles. The contents of these covered receptacles shall be removed at least twice per week when the camp is in use and burned under proper supervision or disposed of in some other sanitary manner.

Pollution of Water Supplies.

6. No privy or other receptacle for sewage or garbage shall be located within 200 feet of any well or spring used as a source of water supply at a public automobile camp excepting it be below the bottom of such well or spring.

Sources of Water Supply, etc., to be posted.

7. Signs shall be posted at each public automobile camp plainly indicating the locations of the source or sources of water supply and the location of all toilets and receptacles for the disposal of garbage and refuse.

Caretakers.

8. At least one caretaker shall be employed at each public automobile camp to visit said camp every day which it is occupied by campers or picnickers, and the caretaker shall keep the camp and its equipment in a clean and sanitary condition.

Maintenance of Sanitary Conditions.

9. The management or owner of every public automobile camp shall assume responsibility for maintaining the camp in proper sanitary condition and for properly maintaining the sanitary appliances.

Rules and Regulations to be posted.

10. These rules and regulations suitably printed shall be posted in conspicuous places at each public automobile camp by the management thereof.

The following changes in personnel have been effected during the year: —

- February 15. Francis A. Finnegan, M.D., District Health Officer of the Worcester County District, resigned.
- April 1. Oscar A. Dudley, M.D., transferred from the Berkshire County District to the Worcester County District.
- May 1. Leland M. French, M.D., transferred from position of Epidemiologist to that of District Health Officer of the Berkshire District.
- May 15. Miss Frances B. Mayer appointed as Social Service Worker in the Subdivision of Venereal Diseases.
- July 17. Miss Angeline D. Hamblen, Statistical Clerk, transferred to Division of Hygiene.
- July 24. Miss Cecilia A. Lemner, Nursing Assistant of the Eastern District, transferred to the Division of Hygiene.
- September 1. Wolfert G. Webber, M.D., appointed as Epidemiologist.
- September 7. Miss Helen C. Reilly transferred from Division of Hygiene to position of Nursing Assistant of the Eastern District.
- September 30. Miss Mary F. Parker, Assistant Bacteriologist in the Diagnostic Laboratory, resigned.
- October 1. Mr. Bernard E. Bradley appointed Special Investigator in the Subdivision of Venereal Diseases.

REPORT OF THE WORK OF THE BACTERIOLOGICAL LABORATORY FOR THE YEAR ENDED NOVEMBER 30, 1922.

During the year ended November 30, 1922, the Bacteriological Laboratory examined 31,490 specimens.

Table I shows the number and kinds of examinations:—

Diphtheria	21,356
Tuberculosis	4,441
Typhoid fever (Widal test)	1,544
Typhoid fever (Culture test)	571
Gonorrhea	2,553
Malaria	91
Miscellaneous	934 ¹

Table II shows the results of examinations:—

	Positive.	Negative.	*Atypical.	Total.
Diphtheria (primary)	1,459	13,873		15,332
Diphtheria (release)	1,907	4,117		6,024
Tuberculosis	994	3,447		4,441
*Typhoid fever (Widal test)	291	1,210	43	1,544
Typhoid fever (Culture test)	47	524		571
Gonorrhea	371	2,182		2,553
Malaria	3	88		91
Miscellaneous				934
				31,490

Diphtheria.

The total number of cultures examined was 1,095 less than last year. 6,220 school cultures were examined, an increase of 623 over last year. While 21,356 examinations are recorded as the total number for diphtheria, on account of the examination of the swab and young cultures of each culture sent for diagnosis, 24,180 additional smears were examined giving a grand total of 45,536 smears stained and examined for diphtheria bacilli.

It has been the custom of the laboratory to report the results of examinations of release cultures on the morning following their receipt, *i.e.*, after 16–24 hours' incubation. 1,400 release cultures which showed no diphtheria bacilli after this period of incubation were incubated an additional 24 hours and re-examined. Of this number 102 or 7.3% were positive after the longer incubation. Therefore it would appear desirable to incubate release cultures 48 hours before sending a negative report.

Another piece of work which the laboratory started with the aid of Miss Mildred Macdonald, then a senior at Simmons College, was a comparison of the growth of diphtheria bacilli on Loeffler's blood serum, Potassium tellurite serum and tellurite egg serum, recommended by Pergola. Several hundred cultures were studied. The conclusion drawn was that neither the tellurite serum nor the tellurite egg serum had any advantage over fresh Loeffler's serum.

Typhoid Fever.

Fewer specimens were sent for the Widal reaction and for isolation of typhoid bacilli from feces and urine than last year. Four carriers were discovered.

¹ Including 575 pneumococcus type determinations; 71 animal inoculations for tubercle bacilli; 130 paratyphoid tests; 14 virulence tests.

Pneumococcus Type Determination.

575 specimens of sputum were examined for type of pneumococcus. The results follow:—

108 specimens contained no pneumococci.

467 specimens contained pneumococci of the following types:—

	Specimens.	Per Cent.
Type I	58	12.4
Type II	25	5.4
Type III	66	14.1
Group IV	318	68.1

The high percentage of group IV pneumococci and of specimens containing no pneumococci would seem to indicate that too many unsuitable specimens are sent to the laboratory for type determination. Many of the specimens received are from cases diagnosed broncho-pneumonia, bronchitis, pleurisy, etc.

The following gives the total number of biological products and diagnostic outfits distributed by the Department of Public Health during the year ending November 30, 1922:—

Biological Products.

<i>Diphtheria Antitoxin:</i>		
7,696 bottles of 1,000 units each	7,696	1,000-unit doses
34,163 bottles of 3,000 units each	102,489	1,000-unit doses
20,859 bottles of 5,000 units each	104,295	1,000-unit doses
12,225 bottles of 10,000 units each	122,250	1,000-unit doses
Total	336,730	1,000-unit doses
<i>Antimeningococcic Serum:</i>		
4,296 bottles of 15 c.c. each		4,296 doses
<i>Antipneumococcic Serum:</i>		
721 bottles of 100 c.c. each, Type I		721 doses
<i>Schick Toxin:</i>		
3,235 outfits of 50 doses each		161,750 doses
155½ c.c. (Bulk)		155½ c.c.
Vaccine Virus (Smallpox)		189,215 doses
<i>Toxin-Antitoxin Mixture:</i>		
54,067 ampoules of 1 c.c. each		54,067 doses
42,340 c.c. (Bulk)		42,340 doses
Total		96,407 doses
<i>Bacterial Vaccine (Typhoid-paratyphoid):</i>		
20,949 ampoules of 1 c.c. each		20,949 doses
46,010 c.c. (Bulk)		46,010 doses
Total		66,959 doses
<i>Normal Serum</i>		
		4,665 c.c.
<i>Silver Nitrate Solution:</i>		
60,564 ampoules		60,564 doses

Diagnostic Outfits.

Diphtheria culture outfits	25,371
Culture Media	525
Tuberculosis sputum outfits	6,808
Pneumonia sputum outfits	607
Widal outfits	2,147
Typhoid culture outfits	926
Malaria-gonorrhea outfits	2,359

REPORT OF THE SUBDIVISION OF VENEREAL DISEASES.

The Subdivision of Venereal Diseases has been able to function better and has shown considerable activity this year, particularly the latter six months, due mainly to the addition of a Social Worker and a Special Investigator, and the change of status and duties of the Sanitary Inspector.

Incidence of Venereal Diseases. — Representative physicians throughout the State have been visited to get an expression of opinion as to the incidence of venereal diseases. Opinions differ greatly; probably it is yet early in the campaign to see definite results, but there can be no doubt about the fact that the use of over 120,000 doses of the State arsphenamine alone has had a beneficial effect in shortening the period of infectivity of patients, thereby preventing many new cases, most physicians and the specialists in venereal diseases saying that they are seeing fewer primary and secondary lesions now than in former years. After the war activities it was natural to expect the reporting to decline. It is believed that the low reporting point has been about reached in gonorrhea, and that a rise in numbers is now to be expected; a slightly larger number of cases have been reported this year over last without any effort being made to stimulate physicians to report.

Clinics. — Increased activity is shown at the State Approved Clinics in the number of new cases, the total number of patients and the total number of treatments. During the year close cooperation has been established with thirteen additional subsidiary clinics, mainly at State institutions. The Board of Health of Framingham has been encouraged to start a clinic, while several other treatment centers are contemplated — one on the Cape, one in the western and one in the northeastern part of the State.

Arsphenamine. — Approximately 6,000 more doses of arsphenamine were distributed than last year, actually more than the figures show as the figures this year are based on 0.6 gram doses while in other years only larger ampoules were reduced to 0.6 gram doses.

Mercury. — As mercury still holds its place in the treatment of syphilis, and inasmuch as Grey Oil and other preparations were being used, the amount of mercury the patient was receiving was problematical in a great many clinics. Therefore, it was decided to supply mercury in a soluble form in definite doses that would be absorbed in about a week after intramuscular injection. This was greatly appreciated by clinicians, boards of health and hospital superintendents, as expressed verbally and by letters received.

Social Service. — During the six months the Social Worker has been with the Subdivision she has visited 27 boards of health, 15 clinics, 10 courts, 50 social agencies in 18 cities and towns, 5 correctional institutions, made 26 special investigations in 9 cities and towns, and has given 10 lectures. In most cases pleasant cooperation was established, particularly with the local boards of health. Many more sources of infection were investigated, due mainly to the Subdivision taking over this phase of the work formerly performed by the Interdepartmental Social Hygiene Board. The majority of the sources of infection were located, examined and placed under treatment.

Lapsed Cases. — More cases were reported as having lapsed treatment than ever before. This may be partly due to the fact that the clinics are being more strict regarding payment for treatment. About 25% were returned to treatment, which is a little below the average.

Courts. — A Special Investigator visited about 25 courts — police, municipal and district — and the judges and probation officers were interviewed. In most cases assurances were received of full cooperation. A pleasing feature has been that the judges believe that the present law is sufficient and that they are able to have all sex offenders examined and if necessary treated.

Druggists. — A total of 641 druggists in 98 cities and towns have been visited to obtain their cooperation in discontinuing the practice of dispensing proprietary

medicines used for the treatment of venereal diseases. In the majority of cases cooperation was promised, and in 31 instances the druggist emptied the contents of the bottle in the sink.

Quarterly Conferences of Clinic Chiefs.—The Quarterly Conferences have been continued this year, and as in the past have been well attended and appreciated.

State-approved Clinics, Jan. 1, 1922, to Dec. 31, 1922.

	Total New Patients.	Total Patients.	Monthly Average of Total Patients.	Total Treatments given.	Number of Doses of Arsphenamine.
Attleboro	21	132	11.0	312	156
Boston City Hospital	541	9,406	783.8	875 ¹	4,347
Boston Dispensary	1,486	20,171	1,680.9	52,986	12,535
Massachusetts General Hospital	1,637	55,620	4,635.0	15,168	7,982
Massachusetts Homœopathic Hospital	393	7,953	662.7	8,687	2,492
Brockton	67	1,380	115.0	2,153	686
Fall River	147	1,626	135.5	5,711	619
Fitchburg ²	25	201	16.7	524	188
Haverhill	79	709	59.0	1,694	309
Holyoke	39	775	64.5	622	297
Lawrence	98	1,245	103.7	1,835	404
Lowell	210	2,677	223.0	5,428	917
Lynn	135	2,688	224.0	3,185	716
New Bedford	303	5,384	448.6	5,437	1,238
Pittsfield	9	71	5.9	255	64
Salem	128	937	78.0	1,673	975
Springfield	116	5,308	442.3	3,597	1,174
Worcester	125	2,023	168.5	2,318	1,406
	5,559	118,306	9,858.1	112,460	36,505

¹ Recorded on reports for Jan. and Feb. only.

² Closed after August.

Subsidiary Clinics, Jan. 1, 1922, to Dec. 31, 1922.

	Total New Patients.	Total Patients.	Monthly Average of Total Patients.	Total Treatments given.	Number of Doses of Arsphenamine.
Boston State Hospital	15	87	7.2	156	156
Bridgewater State Hospital	57	277	23.0	1,842	975
Carney Hospital, Boston	36	245	20.4	853	690
Danvers State Hospital	70	920	76.6	1,688	930
Frammingham Board of Health ¹	7	30	2.5	43	46
Grafton State Hospital	8	66	5.5	532	28
Mass. Reformatory, Concord Junction	58	465	38.7	1,728	110
Medfield State Hospital	22	128	10.6	332	97
Memorial Hospital, Worcester	23	388	32.3	245	109
Monson State Hospital	20	118	9.8	250	186
Northampton State Hospital	12	40	3.3	360	79
Psychopathic Hospital, Boston	65	1,573	131.0	2,067	1,935
Reformatory for Women, Frammingham	106	1,248	104.0	23,138	363
Rutland State Sanatorium	6	92	7.6	10	6
State Industrial School, Lancaster	31	455	37.9	3,713	489
State Prison, Charlestown	23	285	23.7	24	—
Taunton State Hospital	25	205	17.0	112	647
State Infirmary, Tewksbury	288	1,649	137.4	10,072	1,122
Westborough State Hospital	54	535	44.5	876	860
Worcester State Hospital	49	462	38.5	983	724
Wrentham State School	8	82	6.8	25	—
	983	9,350	778.3	49,049	9,552

¹ First report received in September.

Jan. 1, 1922, to Dec. 31, 1922.

Cases reported by number:

Gonorrhea	4,973	
Syphilis	1,933	
		6,906
Cases reported by name (lapsed cases)		1,436
Lapsed cases returned to treatment		409
Arsphenamine distributed, figured on 0.6 gm. doses		42,083
Wassermann examinations		47,514
Smear examinations ¹		2,423
Pamphlets distributed		18,113
Lectures		14
Tin signs posted, approximately		4,000
Collapsules of mercury distributed:		
Bichloridol	9,120	
Salicidol	560	
		9,680
Bottles of Normal Sodium Solution distributed		53

¹ Refers only to smear examinations made in State Laboratory. Each clinic examines smears also.*Comparison.*

	MONTHLY AVERAGE OF NEW PATIENTS.				MONTHLY AVERAGE OF TOTAL PATIENTS.			
	1919.	1920.	1921.	1922.	1919.	1920.	1921.	1922.
Attleboro	2.8	2.6	3.1	1.7	11.5	13.0	16.7	11.0
Boston City Hospital	45.8	41.5	55.7	45.0	203.1	358.0	601.1	733.8
Boston Dispensary	149.3	201.7	119.4	123.8	2,132.6	2,382.9	1,958.2	1,680.9
Mass. General Hospital	247.1	208.1	168.4	136.4	1,239.5	1,706.0	2,972.6	4,635.0
Mass. Homœopathic Hospital	25.1	28.9	33.0	32.7	191.4	285.9	499.5	662.7
Brockton	4.0	8.1	7.2	5.5	11.3	29.7	76.4	115.0
Fall River	6.6	8.5	12.3	12.2	66.3	80.5	108.4	135.5
Fitchburg	5.6	3.7	4.7	2.0	10.3	11.0	23.0	16.7
Haverhill ¹	—	—	3.6	6.5	—	—	18.8	59.0
Holyoke ²	—	—	3.8	3.2	—	—	35.6	64.5
Lawrence	12.5	9.8	11.6	8.1	54.8	76.4	152.2	103.7
Lowell	7.0	21.6	21.5	17.5	88.6	106.4	218.9	223.0
Lynn	12.5	10.5	9.9	11.2	55.3	82.5	178.0	224.0
New Bedford	27.8	26.3	23.5	25.2	178.1	208.2	327.0	448.6
Pittsfield	1.5	1.4	.9	.8	3.6	5.6	7.8	5.9
Salem	1.8	5.7	10.4	10.6	6.5	25.6	68.3	78.0
Springfield ³	—	29.6	15.0	9.6	—	171.8	284.5	442.3
Worcester	11.6	10.1	13.4	10.4	101.6	126.6	171.2	168.5
	561.0	618.1	517.4	462.4	4,354.5	5,670.1	7,718.2	9,858.1

¹ Clinic opened November 1, 1920.² Clinic opened April, 1920.³ Clinic opened Nov., 1920.

The averages for 1919 are based on a six month period, from June 1 to Dec. 1, 1919.

The averages for 1920 cover the year from December 1, 1919, to December 1, 1920.

The averages for 1921 cover the year from January 1, 1921, to December 31, 1921.

REPORT OF THE EPIDEMIOLOGIST.

General. — No outbreaks of communicable disease of any considerable magnitude took place during the year. Minor outbreaks to the number of 52 were investigated by the District Health Officers. These were distributed as follows:

District No. 1	8
District No. 2	11
District No. 3	10
District No. 4	11
District No. 5	4
District No. 6	4
District No. 7	4

Interstate Reciprocal Notifications were sent out in 22 cases.

High incidence of communicable disease was noted in many cities and towns. (See subjoined table.) During February and March there was a marked increase in influenza.

Diphtheria was reported in 8,808 cases for the fiscal year, a slight decrease from the calendar year 1921 when 9,100 cases were reported. The highest diphtheria incidence (per 1,000 population) for the year 1922 was noted in the towns of West Newbury, 21 cases (14 per 1,000 population); Hatfield, 33 cases (12 per 1,000 population); and Marion, 14 cases (10 per 1,000 population).

Diphtheria deaths for the fiscal year were 563 in number, less than for the calendar year 1921 when 607 deaths were recorded.

YEAR.																Death Rate per 100,000 Population.
1916	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	16.7
1917	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	21.8
1918	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	15.6
1919	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	15.5
1920	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	15.3
1921	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	15.6
1922	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	14.3

The decrease in the death rate from diphtheria for 1922 can probably be ascribed to the increased general interest in the problem of diphtheria, as a result of which immunization of children has been begun in many localities. It is to be hoped that in another year the continuance of the campaign will bring a greater reduction in the death rate from this preventable disease.

Scarlet fever was reported in 7,636 cases for the fiscal year, a decrease from 8,331 cases in 1921. The highest incidence (per 1,000 population) was noted in —

Stoughton	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	118 cases (17 per 1,000 population)
Stoneham	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	88 cases (10 per 1,000 population)
Chatham	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	18 cases (10 per 1,000 population)

Deaths from scarlet fever reported for the fiscal year were 142, with a death rate of 3.62, a decrease from last year when 191 deaths were recorded.

YEAR.																Death Rate per 100,000 Population.
1916	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3.4
1917	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3.1
1918	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2.0
1919	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3.2
1920	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5.6
1921	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	4.9
1922	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3.6

Experience of the current year has corroborated that of previous years, namely, that in the absence of explosive outbreaks due to contamination of milk, scarlet fever is spread mainly through contact with mild or missed cases. Numerous cases so contracted are fatal, and many mild cases develop heart and kidney complications. The lesson can only be reiterated that all cases of sore throat or rash should be isolated. This was brought out especially in Stoughton where many

mild cases were diagnosed at first as German measles. The result of this error was a marked spread of the disease in that town.

Measles was reported in 21,508 cases for the fiscal year, an increase over 17,827 for the year 1921. The highest incidence was noted at —

Provincetown	307 cases (72 per 1,000 population)
West Brookfield	79 cases (61 per 1,000 population)
Manchester	128 cases (58 per 1,000 population)

There were 176 deaths from measles reported during the fiscal year 1922. During 1921 there were 179 deaths (death rate per 100,000, 4.6). Death rate for the fiscal year 1922 was 4.48 (per 100,000 population).

Measles continues to take high toll of young children. The fatal cases are contracted usually from unisolated cases in older children (incipient, mild or missed cases). The solution lies in better school inspection and isolation of all cases of coryza, sore throat or rash.

Whooping cough was reported in 5,814 cases for the fiscal year, a slight increase over 5,703 cases for 1921. During the fiscal year 260 deaths from whooping cough were reported; during 1921 there were 201 deaths (death rate per 100,000 population, 5.2; death rate per 100,000 children under 5, 52.2). The death rate per 100,000 population for the fiscal year 1922 was 6.6 (67.5 per 100,000 children under 5).

Whooping cough is a dangerous disease for young children. As in measles, it is usually contracted from older children not recognized to have the disease, or not isolated.

Typhoid fever was reported in 705 cases for the fiscal year, a decrease from 917 cases for 1921. During 1921, 119 deaths were reported, giving a death rate of 3.1 per 100,000 population while during the fiscal year 1922, 84 deaths were reported giving a death rate per 100,000 population of 2.14. No extensive outbreak occurred which could be traced to water, milk or food. Investigation failed to disclose the source of infection in the great majority of the cases; 60 were apparently due to contact with known cases; 42 were imported from out of the state.

In one instance (Milton) 8 cases were shown to be due to a carrier infecting a small milk supply.

Four new carriers were discovered during the year, two of whom had typhoid within a year. The other two gave no history of typhoid. The number of typhoid carriers discovered is not proportional to the number of cases of typhoid fever. Carriers discovered are less than 1% of the number of typhoid cases. Presumably most of our typhoid cases are due to carriers and missed cases.

Tuberculosis, pulmonary, was reported in 5,706 cases for the fiscal year, a decrease from 6,168 cases reported in 1921. During the fiscal year there were 3,232 deaths from pulmonary tuberculosis (death rate per 100,000 population 82.2) as compared with 3,314 deaths for 1921 (death rate 84 per 100,000 population).

Reporting. — Comparison of number of deaths from pulmonary tuberculosis with number of cases reported indicates that only a small part of the existing cases are recognized or reported. In 1922, deaths were 56.7% of cases reported, instead of 14% as they should be. The safety of the patient and efficacy of treatment demand early recognition and reporting.

Tuberculosis, other forms, was reported in 837 cases for the fiscal year, as compared with 827 for 1921. Deaths from this cause were 471 (death rate per 100,000 population 12) against 553 in 1921 (death rate per 100,000 population 14.2). Deaths in 1922 were 56% of cases reported, indicating that in most instances the disease was only recognized and reported shortly before death. In many cases, tuberculosis is not reported until the death certificate is filed.

Actinomycosis was reported from Boston and Brockton, one case each; 3 deaths were reported from this cause for the fiscal year.

Anterior poliomyelitis was reported in 222 instances as against 233 for 1921. Cases were nearly limited to the eastern half of the state, but no localized outbreaks occurred. The deaths numbered 33 as compared with 48 for 1921.

Anthrax was reported from Boston, 1 and Peabody, 2. One death was reported.

Dog bite requiring anti-rabic treatment was reported in 190 cases for the fiscal year against 118 for 1921.

YEAR.	Cases.
1915	174
1916	71
1917	60
1918	20
1919	54
1920	67
1921	118
1922	190

Dog bite requiring anti-rabic treatment was made reportable in 1914. From 1915 to 1918 a marked decrease is noted in cases reported, with an even greater increase since 1918.

Two deaths from rabies were reported for the fiscal year. Neither had received Pasteur treatment. Three deaths from this cause were reported in 1921. This was the highest number since 1915 when 5 deaths were reported.

Encephalitis lethargica was reported in 162 cases for the fiscal year against 117 for 1921. The largest number reported in one month was 46 cases in April; 28 cases were reported in March and 29 in May. The remainder were scattered throughout the year. Cases were almost limited to the eastern half of the state. All cases were personally investigated by District Health Officers but nothing new of epidemiological significance was noted. There were 80 deaths reported during the fiscal year 1922 as against 81 for the year 1921.

Epidemic cerebrospinal meningitis was reported in 110 cases for the fiscal year against 164 for 1921. During the year there were 34 deaths reported as compared with 49 for 1921. The largest number of cases reported in one month was 15 in November; March and April had 14 cases each.

Influenza.—There was a marked general increase in influenza during February and March; 5,217 cases were reported in February and 1,645 in March. The number of deaths reported from this cause was 563 for the fiscal year, the same as from diphtheria. The death rate was 14.3 per 100,000 population. For 1921, the deaths numbered 153.

YEAR.	Death Rate per 100,000 Population.
1916	14.3
1917	12.9
1918	352.7
1919	74.9
1920	42.1
1921	3.9
1922 (fiscal year)	14.3

Leprosy.—One case was reported for the fiscal year. Epidemiological investigation showed that the source of infection was probably outside the state. The patient was removed to the Federal Leprosarium at Carville, Louisiana.

Smallpox. — Two cases were reported for the fiscal year. One was infected outside the state. The other case was in a child $3\frac{1}{2}$ years. No source of infection was discovered by investigation.

In view of an outbreak of smallpox in an adjacent state it is not unlikely that smallpox will increase markedly during the coming year. It is difficult to estimate the proportion of the population who have been vaccinated within 7 years but it cannot be large.

Tetanus. — There were 33 cases reported for the fiscal year. Deaths reported from this cause were 22 as compared with 28 for 1921. The largest number of deaths in one month from this cause was 6 in August.

Cities and towns showing unusually high incidence of diphtheria and scarlet fever for 1922.

DIPHTHERIA AND SCARLET FEVER.

	CITIES AND TOWNS.	Cases.	Case Rate per 1,000 Population.
<i>Incidence for State.</i>			
Diphtheria . . . . .	. . . . .	. . . . .	2.24
Scarlet fever . . . . .	. . . . .	. . . . .	1.94
<i>District No. 1.</i>			
Diphtheria	Fairhaven	26	3.70
Diphtheria	Marion	14	11.85
Scarlet fever	Chatham	18	10.12
Scarlet fever	Middleborough	31	3.71
Scarlet fever	Norton	7	3.09
Scarlet fever	Plymouth	93	7.10
Scarlet fever	Somerset	15	4.17
Scarlet fever	Rehoboth	11	5.55
Scarlet fever	Wareham	39	9.75
<i>District No. 2.</i>			
Diphtheria	BOSTON	2,625	3.50
Diphtheria	BROCKTON	370	5.42
Scarlet fever	West Bridgewater	9	3.00
Scarlet fever	Whitman	58	8.35
Scarlet fever	Milton	53	5.41
Scarlet fever	NEWTON	158	3.32
Scarlet fever	Stoughton	118	17.35
Scarlet fever	Wellesley	21	3.44
Scarlet fever	Rockland	52	6.67
Scarlet fever	Weymouth	75	4.80
Scarlet fever	Bridgewater	32	4.03
Scarlet fever	Cohasset	25	9.80
Scarlet fever	Holbrook	19	5.80
Scarlet fever	Avon	9	4.12
Scarlet fever	Braintree	45	4.01
Scarlet fever	BROCKTON	315	4.61
Scarlet fever	East Bridgewater	14	4.14
Scarlet fever	Hanson	10	5.01
Scarlet fever	Marshfield	5	4.18
<i>District No. 3.</i>			
Diphtheria	PEABODY	106	5.30
Diphtheria	West Newbury	21	14.25
Diphtheria	Danvers	50	4.51
Scarlet fever	Stoneham	88	10.90
Scarlet fever	MELROSE	79	4.18
<i>District No. 4.</i>			
Diphtheria	WALTHAM	96	3.06
Diphtheria	Watertown	97	4.03
Scarlet fever	WALTHAM	228	7.30
<i>District No. 5.</i>			
Diphtheria	FITCHBURG	123	2.94
Scarlet fever	Gardner	59	3.41
Scarlet fever	Templeton	19	4.76

DIPHTHERIA AND SCARLET FEVER—*Concluded.*

	CITIES AND TOWNS.	Cases.	Case Rate per 1,000 Population.
<i>District No. 6.</i>			
Diphtheria	Hatfield	33	12.40
Diphtheria	Easthampton	37	3.08
Diphtheria	Ludlow	25	3.08
Diphtheria	WESTFIELD	56	2.99
Diphtheria	Ware	64	7.92
Scarlet fever	Hatfield	18	6.76
Scarlet fever	NORTHAMPTON	64	2.90
<i>District No. 7.</i>			
Diphtheria	Montague	47	6.24
Diphtheria	Orange	23	4.26
Diphtheria	Adams	54	4.20
Diphtheria	Erving	13	9.56
Scarlet fever	Adams	45	3.51
Scarlet fever	Dalton	17	4.60
Scarlet fever	PITTSFIELD	134	3.12

Measles, 1922.

	Cases.	Case Rate per 1,000 Population.
Measles		5.47
Dighton	52	19.90
Provincetown	307	72.76
Rehoboth	33	16.68
Swansea	37	16.70
Wellfleet	65	84.50
CAMBRIDGE	1,479	13.45
QUINCY	849	16.45
Walpole	194	35.80
Manchester	128	58.00
Marblehead	144	20.06
PEABODY	283	14.15
SALEM	475	10.05
Methuen	418	26.40
North Andover	200	31.10
WALTHAM	433	13.80
Weston	42	18.68
Hopedale	62	21.80
Webster	158	11.61
West Brookfield	79	61.60
NORTHAMPTON	226	10.22
WESTFIELD	200	10.70
Gill	48	57.00

Cases and Deaths, with Case and Death Rates, per 100,000 Population for All Reportable Diseases during the Year 1922.

DISEASE.	Cases.	Deaths.	Case Rate.	Death Rate.	Fatality Rate (Per Cent).
Actinomycesis	3	2	.1	.1	66.7
Anterior Poliomyelitis	217	34	5.5	.9	15.7
Anthrax	3	1	.1	—	33.3
Chicken pox	5,177	8	131.5	.2	.2
Diphtheria	8,826	589	224.2	14.8	6.7
Dog bite, requiring anti-rabic treatment	181	—	4.6	—	—
Dysentery	14	10	.4	.3	71.4
Encephalitis Lethargica	163	82	4.1	2.1	50.3
Epidemic Cerebrospinal Meningitis	105	38	2.7	1.0	36.2
German Measles	480	2	12.2	.1	.4
Gonorrhea	4,973	10	126.3	.3	.2
Hookworm	42	—	1.1	—	—
Influenza	7,453	591	189.4	15.0	7.9
Leprosy	1	—	—	—	—
Malaria	48	4	1.2	.1	8.3
Measles	23,291	214	591.7	5.4	.9
Mumps	4,358	1	110.7	—	—
Ophthalmia Neonatorum ¹	1,219	—	31.0	—	—
Pellagra	15	8	.4	.2	53.3
Pneumonia, Lobar	5,194	2,341	132.0	59.5	45.0
Rabies	2	5	.1	.1	250.0
Scarlet Fever	7,868	146	199.9	3.7	1.9
Septic Sore Throat	123	25	3.1	.6	20.3
Smallpox	2	—	.1	—	—
Syphilis	1,933	208	49.1	5.3	10.7
Tetanus	33	23	.8	.6	69.7
Trachoma	96	—	2.4	—	—
Trichinosis	19	4	.5	.1	21.1
Tuberculosis, Pulmonary	5,562	3,270	141.3	83.1	58.8
Tuberculosis, Other Forms	817	457	20.8	11.6	55.9
Typhoid Fever	693	86	17.6	2.2	12.4
Typhus Fever	—	—	—	—	—
Whooping Cough	6,823	300	173.3	7.6	4.4
	85,734	8,459	2,178.2	214.9	9.9

¹ Includes suppurative conjunctivitis.

Index to Line Numbers in the Table of Cases and Deaths from Diseases Dangerous to the Public Health, 1922.

Abington	111	Dracut	108	Lenox	182
Acton	196	Dudley	145	Leominster	40
Acushnet	143	Dunstable	333	Leverett	301
Adams	63	Duxbury	238	Lexington	98
Agawam	120			Leyden	336
Alford	348	East Bridgewater	144	Lincoln	282
Amesbury	69	East Brookfield	283	Littleton	243
Amherst	117	East Longmeadow	171	Longmeadow	153
Andover	80	Eastham	329	Lowell	10
Arlington	42	Easthampton	65	Ludlow	82
Ashburnham	199	Easton	121	Lunenburg	215
Ashby	291	Edgartown	261	Lynn	12
Ashfield	287	Egremont	332	Lynnfield	257
Ashland	180	Enfield	292		
Athol	76	Erving	236	Malden	21
Attleboro	41	Essex	234	Manchester	190
Auburn	128	Everett	28	Mansfield	100
Avon	193			Marblehead	94
Ayer	152	Fairhaven	87	Marion	258
		Fall River	9	Marlborough	54
Barnstable	124	Falmouth	149	Marshfield	256
Barre	148	Fitchburg	27	Mashpee	350
Becket	311	Florida	351	Mattapoisett	252
Bedford	239	Foxborough	126	Maynard	92
Belchertown	198	Frammingham	46	Medfield	140
Bellingham	195	Franklin	99	Medford	24
Belmont	64	Freetown	225	Medway	157
Berkley	281			Melrose	44
Berlin	284	Gardner	47	Mendon	275
Bernardston	294	Gay Head	361	Merrimac	191
Beverly	37	Georgetown	201	Methuen	51
Billerica	135	Gill	285	Middleborough	81
Blackstone	141	Gloucester	38	Middlefield	344
Blandford	323	Goshen	357	Middleton	262
Bolton	300	Gosnold	363	Millford	59
Boston	3	Grafton	93	Millbury	112
Bourne	178	Granby	296	Millis	219
Boxborough	343	Granville	306	Millville	184
Boxford	309	Great Barrington	104	Milton	77
Boylston	288	Greenfield	48	Monroe	364
Braintree	66	Greenwich	327	Monson	125
Brewster	302	Groton	197	Montague	90
Bridgewater	86	Groveland	165	Monterey	346
Brimfield	299			Montgomery	352
Brookton	16	Hadley	161	Mount Washington	365
Brookfield	231	Halifax	310		
Brookline	29	Hamilton	220	Nahant	246
Buckland	237	Hampden	304	Nantucket	170
Burlington	277	Hancock	320	Natick	70
		Hanover	173	Needham	91
Cambridge	11	Hanson	202	New Ashford	360
Canton	105	Hardwick	164	New Bedford	8
Carlisle	319	Harvard	147	New Braintree	331
Carver	315	Harwich	213	New Marlborough	273
Charlemont	298	Hatfield	168	New Salem	318
Charlton	204	Haverhill	18	Newbury	259
Chatham	207	Hawley	330	Newburyport	52
Chelmsford	107	Heath	341	Newton	22
Chelsea	25	Hingham	113	Norfolk	267
Cheshire	227	Hinsdale	276	North Adams	36
Chester	248	Holbrook	150	North Andover	101
Chesterfield	328	Holden	151	North Attleborough	78
Chicopee	30	Holland	359	North Brookfield	181
Chilmark	355	Holliston	167	North Reading	247
Clarksburg	260	Holyoke	17	Northampton	39
Clinton	62	Hopedale	162	Northborough	210
Cohasset	172	Hopkinton	192	Northbridge	73
Colrain	222	Hubbardston	272	Northfield	208
Concord	102	Hudson	85	Norton	187
Conway	286	Hull	221	Norwell	253
Cummington	325	Huntington	229	Norwood	58
Dalton	137	Ipswich	103	Oak Bluffs	279
Dana	308			Oakham	317
Danvers	68	Kingston	177	Orange	119
Dartmouth	95			Orleans	280
Dedham	72	Lakeville	233	Otis	337
Deerfield	163	Lancaster	183	Oxford	132
Dennis	232	Lanesborough	271		
Dighton	169	Lawrence	14	Palmer	74
Douglas	194	Lee	134	Paxton	313
Dover	290	Leicester	136	Peabody	43

Pelham	312	Shirley	186	Warren	154
Pembroke	235	Shrewsbury	129	Warwick	345
Pepperell	185	Shutesbury	354	Washington	353
Peru	362	Somerset	139	Watertown	35
Petersham	305	Somerville	15	Wayland	203
Phillipston	334	South Hadley	115	Webster	57
Pittsfield	26	Southampton	297	Wellesley	106
Plainfield	338	Southborough	205	Wellfleet	293
Plainville	240	Southbridge	56	Wendell	335
Plymouth	61	Southwick	265	Wenham	266
Plympton	324	Spencer	110	West Boylston	206
Prescott	356	Springfield	7	West Bridgewater	158
Princeton	303	Sterling	250	West Brookfield	249
Provincetown	127	Stockbridge	212	West Newbury	224
Quincy	19	Stoneham	84	West Springfield	55
Randolph	123	Stoughton	97	West Stockbridge	278
Raynham	216	Stow	268	West Tisbury	340
Reading	89	Sturbridge	217	Westborough	114
Rehoboth	200	Sudbury	270	Westfield	45
Revere	33	Sunderland	245	Westford	146
Richmond	307	Sutton	179	Westhampton	347
Rochester	274	Swampscott	79	Westminster	254
Rockland	88	Swansea	189	Weston	188
Rockport	138	Taunton	31	Westport	155
Rowe	342	Templeton	133	Westwood	241
Rowley	264	Tewksbury	130	Weymouth	53
Royalston	289	Tisbury	251	Whately	244
Russell	242	Tolland	358	Whitman	96
Rutland	214	Topsfield	295	Wilbraham	160
Salem	23	Townsend	226	Williamsburg	209
Salisbury	211	Truro	314	Williamstown	142
Sandisfield	322	Tyngsborough	269	Wilmington	166
Sandwich	228	Tyringham	349	Winchendon	109
Saugus	67	Upton	218	Winchester	71
Savoy	326	Uxbridge	116	Windsor	321
Scituate	175	Wakefield	60	Winthrop	49
Seekonk	159	Wales	316	Woburn	50
Sharon	176	Walpole	118	Worcester	5
Sheffield	255	Waltham	32	Worthington	339
Shelburne	230	Ware	83	Wrentham	156
Sherborn	223	Wareham	131	Yarmouth	263
				Tewksbury State Infirmary	366

Cases and Deaths from Diseases Dangerous

Line No.	CITIES AND TOWNS GROUPED IN ORDER OF POPULATION.	Popu- lation esti- mated as of July 1, 1922.	22 An- terior Polio- mye- litis.		25A Chicken Pox.		10 Diph- theria.		24 Ep. Cere- bro- spinal Menin- gitis.		25B Ger- man Mea- sles.		40 Gonor- rhea.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
1	Massachusetts	3,936,064	217	34	5177	8	8826	589	105	38	480	2	4973	10
2	CITIES OVER 500,000.													
3	Boston	749,440	47	11	1183	1	2728	143	22	11	127	-	2369	1
4	CITIES OVER 150,000.													
5	Worcester	188,731	4	-	163	-	352	29	4	1	5	-	263	-
6	CITIES, 100,000-150,000.	715,538	41	9	742	-	1468	187	30	12	62	1	946	3
7	Springfield	143,637	1	-	120	-	165	24	4	3	24	-	213	1
8	New Bedford	127,347	14	5	83	-	309	23	2	-	2	1	65	-
9	Fall River	118,220	11	1	68	-	330	52	12	4	7	-	170	1
10	Lowell	115,274	1	1	48	-	215	16	5	5	13	-	218	-
11	Cambridge	110,152	6	-	347	-	205	9	3	-	14	-	179	-
12	Lynn	100,908	8	2	76	-	244	13	4	-	2	-	101	1
13	CITIES, 50,000-100,000.	428,858	27	4	410	-	1048	70	11	5	35	-	396	-
14	Lawrence	96,380	8	2	42	-	112	16	5	1	11	-	117	-
15	Somerville	96,374	14	1	86	-	175	19	2	2	8	-	56	-
16	Brockton	68,341	1	-	101	-	372	6	2	-	7	-	17	-
17	Holyoke	59,880	-	-	28	-	142	21	1	1	5	-	44	-
18	Haverhill	56,217	2	1	68	-	152	7	1	1	1	-	145	-
19	Quincy	51,666	2	-	85	-	95	1	-	-	3	-	17	-
20	CITIES AND TOWNS, 25,000-50,000.	533,866	19	4	759	1	1136	85	7	2	69	1	385	4
21	Malden	49,206	2	-	59	-	145	19	1	1	1	-	31	-
22	Newton	47,602	1	1	136	-	63	3	1	-	14	-	12	-
23	Salem	45,334	-	-	57	-	87	14	-	1	5	-	45	-
24	Medford	43,526	4	1	26	-	56	3	-	-	6	-	13	1
25	Chelsea	43,057	-	-	39	1	116	2	-	-	4	-	86	1
26	Pittsfield	42,898	-	-	31	-	82	8	-	-	3	-	23	-
27	Fitchburg	41,752	-	-	34	-	130	8	-	-	2	-	14	-
28	Everett	41,385	3	-	113	-	99	3	2	-	2	-	21	-
29	Brookline	39,988	5	1	189	-	82	4	-	-	10	-	14	2
30	Chicopee	39,412	-	-	-	-	81	10	-	-	-	-	5	-
31	Taunton	37,650	1	1	28	-	24	3	-	-	20	-	66	-
32	Waltham	31,315	1	-	47	-	99	6	-	-	2	-	20	-
33	Revere	30,741	2	-	-	-	72	2	3	-	-	1	35	-
34	CITIES AND TOWNS, 10,000-25,000.	622,885	42	1	826	5	1088	65	17	6	75	-	273	2
35	Watertown	24,057	-	-	21	-	100	2	-	-	4	-	14	-
36	North Adams	22,412	-	-	6	-	11	1	1	-	-	-	5	-
37	Beverly	22,351	-	-	35	-	46	1	-	-	-	-	19	-
38	Gloucester	22,142	1	-	6	-	37	4	-	-	-	-	3	-
39	Northampton	22,106	1	-	44	1	26	5	1	1	7	-	18	-
40	Leominster	20,849	-	-	2	-	20	3	1	-	5	-	5	-
41	Attleboro	20,389	6	-	10	-	11	-	-	-	9	-	13	1
42	Arlington	20,652	1	-	34	-	44	-	-	-	4	-	3	-
43	Peabody	20,040	1	-	14	-	109	1	2	-	4	-	14	-
44	Melrose	18,901	1	1	25	-	16	1	2	1	4	-	2	-
45	Westfield	18,706	1	-	28	-	58	6	-	-	1	-	3	-
46	Framingham	17,650	-	-	46	-	19	1	-	-	1	-	8	-

to the Public Health, 1922.

11		101		7		13		40A		8		38		31, 37 37A, 37B		32-36E		1		9		Line No.
Influenza.		Lobar Pneumonia.		Measles.		Mumps.		Ophthalmia Neonatorum. ¹		Scarlet Fever.		Syphilis.		Tuberculosis, Pulmonary.		Tuberculosis, Other Forms.		Typhoid Fever.		Whooping Cough.		
Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	
7453	591	5194	2341	23291	214	4358	1	1219	-	7868	146	1933	208	5562	3270	817	457	693	86	6823	300	1
1879	66	1360	669	5331	46	1085	-	360	-	1569	45	922	57	1693	724	242	119	101	11	1540	84	2
692	22	335	124	191	6	9	-	160	-	392	13	82	18	253	135	31	20	43	6	283	14	3
1130	103	1009	349	5049	83	766	-	404	-	1160	18	296	30	1077	602	217	94	130	12	825	35	4
54	14	184	57	928	9	262	-	52	-	184	4	102	5	166	73	21	10	16	3	172	4	5
49	22	93	27	752	8	24	-	139	-	215	5	21	7	256	113	62	24	19	-	60	4	6
255	38	206	74	1213	54	109	-	147	-	164	6	40	7	191	115	26	20	45	4	88	15	7
170	3	123	58	146	2	13	-	15	-	127	2	45	4	168	90	36	17	11	3	29	-	8
542	11	250	71	1492	9	335	-	42	-	281	-	52	1	175	129	40	11	15	1	400	6	9
60	15	153	62	518	1	23	-	9	-	189	1	36	6	121	82	32	12	24	1	76	6	10
592	63	585	222	3113	23	632	-	115	-	855	9	144	6	501	270	66	38	71	12	738	30	11
11	21	101	46	735	12	192	-	16	-	44	1	60	-	127	86	9	6	22	1	155	3	12
156	7	144	52	810	3	66	-	16	-	202	3	12	1	95	30	16	4	18	4	138	11	13
6	13	116	32	317	1	10	-	57	-	319	2	17	2	78	26	18	8	9	1	92	1	14
36	12	50	37	371	4	21	-	4	-	59	1	6	1	56	56	5	11	4	1	101	10	15
291	5	112	29	26	-	200	-	16	-	96	-	42	1	75	45	5	6	10	5	66	1	16
92	5	62	26	854	3	143	-	6	-	135	2	7	1	70	27	13	3	8	-	186	4	17
601	67	639	269	3147	21	408	1	78	-	1249	37	149	29	613	299	93	59	97	14	930	43	18
44	8	67	26	240	3	46	-	14	-	190	9	7	-	66	27	11	5	9	4	42	2	19
29	4	56	28	332	-	141	-	2	-	165	3	9	1	34	23	15	6	9	-	156	1	20
13	5	62	23	473	3	16	-	2	-	79	15	10	1	42	25	-	-	2	-	136	5	21
25	-	18	11	349	-	14	-	1	-	79	2	5	-	30	16	1	2	6	-	65	2	22
47	6	132	36	396	2	7	-	38	-	119	1	46	1	81	28	11	5	15	2	59	2	23
26	3	48	29	11	-	81	1	4	-	143	3	15	1	79	28	10	8	10	1	35	7	24
30	4	45	22	42	-	-	-	-	-	42	-	5	-	50	31	2	7	2	2	112	12	25
304	7	56	20	360	2	24	-	6	-	97	-	7	2	53	12	10	2	7	-	118	2	26
42	3	42	15	375	-	40	-	2	-	55	2	9	-	36	22	7	4	5	2	98	-	27
3	9	8	17	101	1	4	-	2	-	17	1	-	-	33	25	5	7	6	2	21	9	28
3	10	47	13	35	-	3	-	3	-	43	-	29	19	52	35	10	8	11	-	15	-	29
28	6	42	21	433	7	32	-	3	-	165	-	2	3	30	21	7	3	10	1	73	-	30
7	2	16	8	-	3	-	-	1	-	55	1	5	1	27	6	4	2	5	-	-	1	31
999	126	727	326	3013	21	624	-	53	-	1204	10	113	24	725	406	100	62	140	19	1063	54	32
17	2	22	6	83	1	3	-	1	-	31	-	4	-	24	9	4	2	1	-	44	-	33
8	6	18	6	8	1	19	-	3	-	15	-	7	2	18	10	5	3	5	2	18	1	34
8	2	42	11	137	-	4	-	2	-	53	1	11	-	24	5	1	-	1	1	19	1	35
4	5	7	10	5	-	1	-	2	-	20	-	3	-	42	16	7	1	-	-	6	3	36
9	9	24	12	201	-	10	-	2	-	64	-	17	11	41	41	2	1	16	-	52	-	37
38	6	37	15	15	-	1	-	-	-	21	1	1	-	38	11	4	4	5	2	38	7	38
152	2	11	8	151	-	2	-	-	-	5	-	5	-	34	27	4	4	1	-	38	2	39
64	2	34	13	148	1	20	-	4	-	26	1	1	-	32	18	6	1	4	-	40	2	40
48	1	17	5	284	3	-	-	1	-	29	-	9	1	31	8	4	2	4	-	46	7	41
6	10	36	13	163	-	81	-	5	-	81	-	2	-	13	6	10	2	5	1	18	-	42
1	4	16	11	201	6	2	-	1	-	1	-	3	1	37	29	2	2	3	-	16	-	43
44	4	22	10	18	1	64	-	-	-	19	-	2	1	18	7	3	3	3	-	43	2	44

¹ Including 436 cases of suppurative conjunctivitis.

Cases and Deaths from Diseases Dangerous

Line No.	CITIES AND TOWNS GROUPED IN ORDER OF POPULATION.	Popu- lation esti- mated as of July 1, 1922.	22		25A		10		24		25B		40	
			An- terior Polio- mye- litis.		Chicken Pox.		Diph- theria.		Ep. Cere- bro- spinal Mening- itis.		Ger- man Mea- sles.		Gonor- rhea.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
47	Gardner	17,284	-	-	19	-	39	1	1	1	1	-	7	-
48	Greenfield	16,959	-	-	7	-	20	2	-	-	1	-	15	-
49	Winthrop	16,875	-	-	67	-	9	1	-	-	4	-	9	-
50	Woburn	16,659	4	-	5	-	39	3	1	-	2	-	6	-
51	Methuen	15,811	2	-	41	1	16	2	-	-	3	-	2	-
52	Newburyport	15,780	-	-	7	-	6	-	-	-	1	-	1	-
53	Weymouth	15,630	1	-	7	-	11	1	-	-	-	-	7	-
54	Marlborough	14,911	-	-	44	1	19	3	-	-	1	-	3	-
55	West Springfield	14,550	1	-	30	-	28	4	1	-	-	-	5	-
56	Southbridge	14,260	-	-	2	-	20	2	3	-	-	-	5	-
57	Webster	13,623	6	-	23	-	3	-	-	-	-	-	3	-
58	Norwood	13,495	1	-	17	-	23	-	-	-	2	-	4	-
59	Milford	13,359	-	-	4	-	13	1	-	-	-	-	4	-
60	Wakefield	13,153	1	-	17	-	43	-	-	-	-	-	4	-
61	Plymouth	13,108	-	-	40	-	18	4	-	-	3	-	6	-
62	Clinton	12,867	2	-	8	-	4	1	1	1	-	-	7	-
63	Adams	12,835	-	-	4	-	54	2	1	1	-	-	3	-
64	Belmont	12,154	1	-	55	-	12	-	1	-	6	-	6	-
65	Easthampton	12,006	-	-	2	-	40	6	-	-	-	-	6	-
66	Braintree	11,230	1	-	14	-	16	-	-	-	7	-	12	-
67	Saugus	11,214	1	-	19	1	12	-	-	-	2	-	3	-
68	Danvers	11,073	1	-	19	-	50	3	-	1	1	-	10	1
69	Amesbury	10,821	-	-	31	-	23	3	-	-	-	-	13	-
70	Natick	10,795	3	-	25	1	21	1	-	-	-	-	13	-
71	Winchester	10,738	-	-	10	-	4	-	-	-	-	-	2	-
72	Dedham	10,660	-	-	29	-	19	-	-	-	2	-	2	-
73	Northbridge	10,659	2	-	3	-	2	-	1	-	-	-	2	-
74	Palmer	10,121	2	-	1	-	27	-	-	-	-	-	6	-
75	TOWNS, 5,000-10,000.	317,017	16	4	416	1	556	30	6	1	51	-	179	-
76	Athol	9,797	-	-	10	-	2	-	-	-	-	-	7	-
77	Milton	9,794	-	-	9	-	8	-	-	-	5	-	-	-
78	North Attleborough	9,153	-	-	-	-	12	-	-	-	-	-	1	-
79	Swampscott	8,499	1	-	19	-	4	-	1	-	-	-	1	-
80	Andover	8,421	1	-	14	-	17	3	-	-	4	-	2	-
81	Middleborough	8,360	-	-	17	1	3	1	-	-	-	-	5	-
82	Ludlow	8,112	-	-	1	-	25	2	-	-	-	-	-	-
83	Ware	8,093	-	-	2	-	64	2	-	-	-	-	1	-
84	Stoneham	8,075	1	-	7	-	29	1	-	-	-	-	3	-
85	Hudson	8,054	-	-	-	-	3	-	-	-	-	-	4	-
86	Bridgewater	7,943	-	-	2	-	14	-	-	-	1	-	6	-
87	Fairhaven	7,824	1	-	4	-	29	6	-	-	1	-	-	-
88	Rockland	7,791	-	-	-	-	3	-	-	-	-	-	5	-
89	Reading	7,772	-	-	-	-	3	-	-	-	-	-	3	-
90	Montague	7,543	-	-	5	-	47	4	-	-	1	-	1	-
91	Needham	7,259	1	-	9	-	8	-	-	-	-	-	1	-
92	Maynard	7,251	-	-	-	-	10	-	-	-	-	-	1	-
93	Grafton	7,222	1	1	-	-	11	-	-	-	-	-	1	-
94	Marblehead	7,176	4	2	2	-	21	-	-	-	-	-	1	-
95	Dartmouth	7,105	1	-	-	-	14	1	-	-	4	-	1	-
96	Whitman	6,952	-	-	3	-	8	-	-	1	3	-	6	-
97	Stoughton	6,803	-	-	8	-	16	1	-	-	4	-	-	-
98	Lexington	6,777	1	-	20	-	3	-	-	-	2	-	3	-
99	Franklin	6,527	-	-	7	-	3	1	-	-	1	-	14	-
100	Mansfield	6,510	-	-	19	-	10	-	1	-	4	-	8	-
101	North Andover	6,427	-	-	22	-	5	-	-	-	1	-	-	-
102	Concord	6,346	-	-	1	-	-	-	1	-	1	-	56	-
103	Ipswich	6,164	-	-	-	-	28	-	-	-	-	-	-	-
104	Great Barrington	6,150	-	-	3	-	6	-	-	-	1	-	13	-
105	Canton	6,115	-	-	20	-	12	-	-	-	1	-	4	-
106	Wellesley	6,111	1	-	82	-	14	-	-	-	5	-	-	-
107	Chelmsford	5,945	-	-	21	-	7	-	-	-	3	-	-	-

to the Public Health, 1922 — Continued.

11		101		7		13		40A		8		38		31, 37 37A, 37B		32-36E		1		9		Line No.
Influenza.		Lobar Pneumonia.		Measles.		Mumps.		Ophthalmia Neonatorum.		Scarlet Fever.		Syphilis.		Tuberculosis, Pulmonary.		Tuberculosis, Other Forms.		Typhoid Fever.		Whooping Cough.		
Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	
1	2	22	13	11	-	2	-	3	-	65	-	-	1	39	14	6	4	2	2	38	4	47
12	2	20	8	123	-	2	-	1	-	26	-	6	-	7	2	3	1	4	-	54	1	48
30	1	31	9	32	-	-	5	1	-	13	-	-	-	18	3	3	-	-	-	116	-	49
29	12	23	13	16	-	-	5	-	-	44	1	6	-	19	6	5	2	2	5	23	1	50
2	2	14	6	418	2	109	-	2	2	49	1	2	2	17	9	1	1	2	23	-	51	
16	2	15	9	9	-	-	-	2	2	24	-	3	1	8	5	-	1	8	36	-	52	
10	3	22	9	9	-	-	-	3	-	86	1	1	1	3	3	-	1	3	11	1	53	
1	9	19	12	19	-	105	-	-	-	13	-	1	-	11	10	1	3	42	2	54		
1	3	11	4	43	1	3	-	2	-	22	-	1	1	14	7	3	1	14	2	55		
47	2	11	5	6	-	-	-	1	-	16	-	1	-	11	10	2	1	10	5	56		
14	1	14	6	158	3	1	-	7	-	19	1	-	-	8	7	4	2	-	-	-	57	
3	-	12	6	142	1	23	-	3	-	17	-	1	-	14	5	7	3	1	27	-	58	
9	4	6	12	32	1	31	-	-	-	7	-	-	-	13	12	4	5	1	13	2	59	
3	3	22	10	118	-	22	-	-	-	93	-	1	-	17	2	1	-	12	1	2	61	
22	2	33	15	9	-	1	-	-	-	16	-	-	-	16	5	1	-	1	5	-	62	
7	7	5	4	-	-	-	-	1	-	47	1	-	-	28	4	-	1	14	1	9	2	63
30	1	13	6	21	-	21	-	-	-	37	-	2	-	13	9	3	-	3	-	73	-	64
2	-	23	7	2	-	5	-	2	-	13	-	2	-	18	6	5	2	-	-	23	2	65
131	-	8	2	47	-	47	-	-	-	45	-	-	1	15	53	-	-	-	-	45	1	66
196	2	12	4	14	-	5	-	-	-	33	-	-	-	15	4	1	-	5	-	26	-	67
11	4	10	11	9	-	1	-	-	-	18	-	1	2	8	16	-	1	2	2	12	1	68
4	1	15	2	9	-	-	-	-	-	26	2	1	-	4	1	-	1	1	-	13	1	69
4	5	12	9	9	-	2	-	-	-	17	-	1	-	7	4	-	2	6	-	9	1	70
7	-	8	2	27	-	8	-	1	-	31	-	1	-	8	3	-	3	3	-	4	1	71
3	1	20	6	20	-	-	-	1	-	29	-	14	-	15	5	2	2	1	22	1	72	
1	2	2	5	180	-	-	-	-	-	1	-	1	-	7	4	3	1	1	1	14	1	73
716	68	287	165	1533	4	334	-	25	-	766	4	185	17	284	169	30	25	49	5	870	17	75
-	2	3	1	206	-	-	-	-	-	2	-	2	-	4	2	-	-	-	-	3	-	76
59	3	14	9	20	-	44	-	1	-	53	-	-	-	7	4	1	-	8	-	16	-	77
1	1	1	4	5	-	-	-	1	-	5	-	-	-	4	2	-	-	-	-	1	2	78
127	4	14	7	22	-	11	-	1	-	14	-	1	-	6	3	2	3	2	-	31	-	79
-	4	8	2	34	-	6	-	1	-	17	-	1	1	10	4	-	-	-	-	81	1	80
-	2	2	5	8	-	12	-	-	-	31	-	3	-	16	5	-	1	2	-	59	-	81
-	4	2	3	-	-	-	-	-	-	2	-	1	-	11	5	-	-	-	-	-	-	82
3	2	4	-	-	-	-	-	-	-	-	-	1	6	6	6	-	1	-	-	3	1	83
36	-	15	6	-	2	-	-	-	-	94	-	2	-	3	5	-	1	-	-	28	-	84
3	-	4	-	-	1	-	-	-	-	-	-	-	-	5	5	-	-	-	-	1	1	85
3	2	5	4	-	2	-	-	2	-	32	-	72	6	29	15	-	1	1	-	-	-	86
7	2	9	4	34	-	1	-	1	-	3	-	-	-	17	7	2	1	-	-	-	-	87
1	10	6	2	2	-	2	-	-	-	52	-	1	1	6	4	-	-	-	-	27	-	88
1	3	2	2	29	-	1	-	1	-	6	-	-	1	6	3	-	2	1	-	2	2	89
24	4	2	6	29	-	-	-	1	-	6	-	6	-	3	5	-	2	5	-	2	1	90
2	3	4	8	-	21	-	-	-	-	22	-	2	-	6	-	-	-	-	-	15	1	91
-	2	1	1	-	-	-	-	-	-	2	-	1	-	3	1	-	1	-	-	-	-	92
-	2	2	7	-	-	-	-	-	-	-	-	-	-	6	21	-	-	-	-	-	1	93
1	-	2	1	144	-	1	-	-	-	6	-	-	-	4	1	-	-	3	1	-	-	94
3	2	1	15	-	-	-	-	2	-	9	-	1	3	3	3	-	2	2	1	4	-	95
96	2	5	3	-	24	-	-	1	-	58	1	1	1	8	2	-	-	-	-	20	-	96
2	-	3	4	3	19	-	-	-	-	120	1	-	-	7	4	1	-	-	-	9	-	97
2	3	9	11	-	6	-	-	-	-	14	-	-	-	13	6	3	-	-	-	13	-	98
52	2	12	1	12	-	-	-	2	-	7	-	4	1	3	2	1	-	-	-	2	-	99
9	1	3	3	200	-	42	-	1	-	8	-	2	-	3	3	-	1	1	-	29	2	100
95	1	8	8	166	-	18	-	-	-	2	-	-	-	6	2	-	-	-	-	55	-	101
-	1	6	1	217	3	-	-	1	-	3	-	13	-	6	3	-	-	-	-	-	-	102
-	1	22	9	7	-	4	-	-	-	11	-	1	-	7	2	1	3	1	14	1	1	103
1	2	4	3	14	-	25	-	-	-	6	-	2	-	4	1	1	1	3	1	47	1	104
3	1	19	8	23	-	13	-	-	-	17	-	1	-	6	3	10	2	-	-	16	-	105
61	2	4	2	1	1	-	-	-	-	22	-	3	-	2	-	-	-	-	-	128	-	106
-	-	-	-	-	-	-	-	-	-	10	-	-	-	2	2	-	-	-	-	30	-	107

Cases and Deaths from Diseases Dangerous

Line No.	CITIES AND TOWNS GROUPED IN ORDER OF POPULATION.	Popu- lation esti- mated as of July 1, 1922.	22		25A		10		24		25B		40	
			An- terior Poli- mye- litis.		Chicken Pox.		Diph- theria.		Ep. Cere- bro- spinal Menin- gitis.		Ger- man Mea- sles.		Gonor- rhea.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
108	Dracut	5,942	-	-	7	-	4	2	-	-	-	-	-	-
109	Winchendon	5,902	2	-	11	-	20	-	1	-	-	-	-	-
110	Spencer	5,897	-	-	7	-	6	-	-	-	3	-	1	-
111	Abington	5,862	-	-	-	-	2	-	-	-	-	-	1	-
112	Millbury	5,841	-	-	1	-	6	-	-	-	2	-	1	-
113	Hingham	5,782	-	-	26	-	14	-	1	-	-	-	-	-
114	Westborough	5,717	-	-	6	-	7	-	-	-	-	-	6	-
115	South Hadley	5,710	-	-	8	-	8	1	1	-	1	-	-	-
116	Uxbridge	5,627	1	1	4	-	6	-	-	-	-	-	4	-
117	Amherst	5,546	-	-	8	-	9	1	-	-	-	-	-	-
118	Walpole	5,423	-	-	28	-	3	1	-	-	1	-	15	-
119	Orange	5,400	-	-	1	-	23	2	-	-	-	-	1	-
120	Agawam	5,268	-	-	-	-	1	1	-	-	-	-	1	-
121	Easton	5,029	-	-	2	-	8	-	-	-	1	-	1	-
122	TOWNS, 2,500-5,000.	172,528	9	-	259	-	190	16	5	-	27	-	72	-
123	Randolph	4,768	1	-	1	-	5	-	-	-	-	-	4	-
124	Barnstable	4,753	1	-	36	-	4	-	-	-	1	-	15	-
125	Monson	4,733	-	-	5	-	1	-	-	-	-	-	-	-
126	Foxborough	4,336	-	-	1	-	1	1	-	-	-	-	6	-
127	Provincetown	4,221	-	-	37	-	-	-	-	-	-	-	7	-
128	Auburn	4,211	-	-	-	-	-	-	-	-	-	-	1	-
129	Shrewsbury	4,188	-	-	-	-	2	1	-	-	-	-	-	-
130	Tewksbury	4,022	-	-	-	-	7	1	-	-	1	-	3	-
131	Wareham	4,015	-	-	3	-	7	-	-	-	-	-	-	-
132	Oxford	4,000	-	-	1	-	7	-	-	-	-	-	-	-
133	Templeton	3,987	-	-	3	-	9	-	-	-	-	-	1	-
134	Lee	3,877	-	-	-	-	1	-	-	-	-	-	4	-
135	Billerica	3,856	-	-	33	-	9	1	-	-	2	-	-	-
136	Leicester	3,800	-	-	-	-	4	-	-	-	-	-	-	-
137	Dalton	3,697	-	-	1	-	16	-	-	-	-	-	-	-
138	Rockport	3,628	2	-	-	-	3	-	-	-	-	-	4	-
139	Somerset	3,595	-	-	-	-	15	1	-	-	-	-	1	-
140	Medfield	3,568	-	-	1	-	-	1	-	-	-	-	3	-
141	Blackstone	3,567	-	-	-	-	4	1	-	-	-	-	-	-
142	Williamstown	3,562	-	-	7	-	-	-	-	-	-	-	-	-
143	Acushnet	3,437	-	-	1	-	3	1	-	-	-	-	-	-
144	East Bridgewater	3,379	-	-	-	-	2	1	1	-	-	-	-	-
145	Dudley	3,348	1	-	5	-	6	-	1	-	-	-	-	-
146	Westford	3,342	-	-	2	-	1	-	-	-	1	-	-	-
147	Harvard	3,304	-	-	-	-	1	-	-	-	-	-	-	-
148	Barre	3,295	-	-	5	-	3	-	-	-	-	-	-	-
149	Falmouth	3,280	-	-	10	-	6	-	1	-	3	-	2	-
150	Holbrook	3,273	-	-	3	-	-	-	-	-	-	-	1	-
151	Holden	3,210	-	-	11	-	3	-	-	-	1	-	6	-
152	Ayer	3,195	-	-	-	-	-	-	-	-	-	-	4	-
153	Longmeadow	3,058	-	-	2	-	-	-	-	-	1	-	-	-
154	Warren	3,045	-	-	9	-	4	1	-	-	-	-	1	-
155	Westport	3,038	1	-	1	-	1	-	-	-	1	-	-	-
156	Wrentham	3,015	1	-	4	-	3	-	1	-	-	-	1	-
157	Medway	3,014	-	-	-	-	1	-	-	-	-	-	-	-
158	West Bridgewater	2,996	-	-	2	-	10	-	-	-	-	-	-	-
159	Seekonk	2,966	-	-	-	-	-	-	-	-	-	-	-	-
160	Wilbraham	2,915	-	-	-	-	5	2	-	-	-	-	1	-
161	Hadley	2,846	-	-	13	-	3	1	-	-	-	-	-	-
162	Hopedale	2,837	-	-	2	-	6	-	-	-	-	-	1	-
163	Deerfield	2,836	-	-	17	-	3	-	-	-	-	-	2	-
164	Hardwick	2,817	-	-	2	-	-	-	-	-	-	-	-	-
165	Groveland	2,793	-	-	25	-	3	-	-	-	-	-	3	-
166	Wilmington	2,713	-	-	5	-	1	-	-	-	-	-	-	-
167	Holliston	2,664	-	-	5	-	-	-	-	-	1	-	-	-
168	Hatfield	2,661	-	-	3	-	34	3	-	-	14	-	-	-

to the Public Health, 1922 — Continued.

11		101		7		13		40A		8		38		31, 37 37A, 37B		32-36E		1		9		Line No.
Influenza.		Lobar Pneumonia.		Measles.		Mumps.		Ophthalmia Neonatorum.		Scarlet Fever.		Syphilis.		Tuberculosis, Pulmonary.		Tuberculosis, Other Forms.		Typhoid Fever.		Whooping Cough.		
Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	
-	-	-	4	3	-	36	-	-	-	7	-	-	-	1	2	-	-	1	-	43	-	108
25	3	3	3	10	-	-	-	-	-	14	1	1	1	3	2	-	-	1	1	8	-	109
11	1	7	1	4	-	1	-	-	-	1	-	-	-	6	3	3	-	-	-	18	-	110
-	1	3	3	-	-	2	-	-	-	19	-	1	-	1	1	-	-	-	-	6	-	111
15	1	23	6	36	-	2	-	1	-	11	-	1	-	2	2	-	-	-	-	5	-	112
4	1	7	1	12	-	4	-	-	-	12	-	2	-	7	1	-	-	1	-	124	2	113
52	-	3	14	5	-	-	-	-	-	4	-	48	1	10	12	-	-	1	-	-	-	114
13	-	13	5	17	-	16	-	-	-	6	-	-	-	1	3	-	-	-	-	16	-	115
-	4	1	1	-	-	-	-	-	-	6	-	6	1	3	2	-	-	1	1	3	-	116
-	1	5	3	16	-	3	-	6	-	11	-	-	-	16	3	1	1	1	1	1	1	117
5	1	8	4	194	-	13	-	3	-	3	-	2	-	3	2	-	-	1	-	10	-	118
1	2	3	3	6	-	-	-	1	-	5	1	4	-	4	1	-	1	-	-	1	-	119
-	-	1	3	3	-	-	-	-	-	20	-	1	-	3	4	-	3	-	-	1	1	120
2	2	2	1	3	-	2	-	1	-	13	-	-	-	3	3	2	-	-	-	1	-	121
317	32	117	91	886	3	246	-	8	-	345	3	17	4	162	134	12	19	29	3	258	15	122
-	-	1	2	4	-	-	-	2	-	14	-	2	-	5	2	-	1	8	-	1	-	123
18	3	6	2	3	-	-	-	1	-	8	-	1	-	2	2	1	-	-	-	-	-	124
-	1	3	50	1	3	-	-	-	-	2	-	-	1	3	3	-	1	-	-	-	-	125
13	-	12	13	10	11	-	-	-	-	1	-	-	2	20	17	1	3	29	-	-	-	126
12	-	-	-	312	-	161	-	-	-	-	-	-	-	6	2	-	1	-	-	5	-	127
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	128
-	-	1	1	-	-	-	-	-	-	1	-	-	-	-	1	-	-	2	-	-	1	129
-	-	1	1	-	-	-	-	-	-	-	-	-	-	3	-	-	1	-	-	5	-	130
-	2	17	4	56	1	2	-	39	-	1	-	1	-	12	4	1	2	-	11	-	-	131
-	2	3	4	9	1	-	-	3	-	-	-	-	-	4	4	-	-	4	-	33	-	132
101	-	3	2	-	-	-	-	1	-	24	-	-	-	2	1	-	1	-	21	2	-	133
-	-	7	-	-	-	-	-	2	-	2	-	-	-	3	5	1	-	-	3	-	-	134
2	-	1	-	9	-	-	-	-	-	4	-	2	-	3	5	-	-	-	2	-	-	135
-	-	1	1	-	-	-	-	-	-	2	-	-	-	1	-	-	-	-	-	1	-	136
3	2	1	3	13	-	-	-	-	-	17	-	-	-	5	3	-	-	-	5	2	-	137
-	-	-	-	2	-	-	-	1	-	3	1	-	-	8	6	1	1	1	-	-	-	138
-	-	1	-	6	1	-	-	-	-	14	-	1	-	5	4	-	-	-	1	1	-	139
-	4	10	26	2	-	-	-	7	-	7	-	2	-	9	22	-	1	-	-	-	-	140
-	1	7	-	-	-	-	-	2	-	2	-	-	-	4	1	1	-	-	-	-	-	141
3	1	1	6	1	-	1	-	13	-	2	-	-	-	2	1	-	-	-	47	1	-	142
-	-	2	7	-	4	-	-	-	-	2	-	-	-	2	1	2	1	-	1	-	-	143
-	-	2	-	-	-	-	-	14	-	-	-	-	-	2	4	-	-	-	-	-	-	144
-	1	4	3	50	-	-	-	36	-	-	-	-	-	-	-	2	2	-	2	-	-	145
12	1	5	3	6	2	-	-	13	-	13	-	-	-	2	3	-	-	-	25	3	-	146
-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	147
-	-	-	-	2	-	-	-	2	-	-	-	-	-	3	5	-	-	-	-	-	-	148
6	2	-	-	10	2	-	-	-	-	-	-	2	-	9	3	-	2	-	6	-	-	149
-	-	-	-	41	-	-	-	19	-	8	-	1	-	1	1	-	-	4	-	1	-	150
37	-	7	5	4	1	-	-	-	-	-	-	-	-	1	1	-	-	-	9	-	-	151
25	2	6	-	2	-	-	-	-	-	-	-	3	-	1	1	-	-	1	-	4	1	152
4	-	1	1	23	8	-	-	-	-	5	-	-	-	5	3	-	-	-	6	-	-	153
55	1	14	3	8	1	1	-	-	-	8	1	-	-	5	4	-	-	-	3	-	-	154
3	1	3	1	8	1	1	-	-	-	9	-	-	-	1	3	-	-	1	1	7	-	155
11	1	3	-	12	-	1	-	-	-	4	-	-	-	2	4	-	-	1	1	6	-	156
-	2	-	-	2	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	157
-	1	-	1	-	-	-	-	-	-	5	-	-	-	4	-	1	-	-	-	-	-	158
-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	159
-	-	-	-	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	160
-	-	-	2	50	-	12	-	-	-	4	1	-	-	1	-	-	1	-	-	1	-	161
-	-	6	-	3	-	-	-	-	-	1	-	-	-	3	2	-	-	1	1	-	-	162
1	1	-	-	-	-	-	-	-	-	1	-	-	-	2	1	-	-	-	-	-	-	163
2	-	6	1	10	33	-	-	-	-	1	-	1	-	-	1	-	1	-	-	6	-	164
-	-	1	1	42	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	1	-	165
1	1	1	-	2	-	-	-	-	-	3	-	-	-	-	1	-	-	-	-	13	1	166
1	2	6	-	7	-	1	-	-	-	1	-	-	-	1	2	-	-	-	-	2	-	167
-	-	-	-	-	-	-	-	-	-	15	-	-	-	4	-	-	-	-	-	1	1	168

Cases and Deaths from Diseases Dangerous

Line No.	CITIES AND TOWNS GROUPED IN ORDER OF POPULATION.	Popu- lation esti- mated as of July 1, 1922.	22 An- terior Poli- mye- litis.		25A Chicken Pox.		10 Diph- theria.		24 Ep. Cere- bro- spinal Menin- gitis.		25B Ger- man Meas- les.		40 Gonor- rhea.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
169	Dighton	2,614	-	-	-	-	-	-	-	-	1	-	-	-
170	Nantucket	2,602	1	-	-	-	-	-	-	-	-	-	-	-
171	East Longmeadow	2,569	-	-	2	-	2	-	-	-	-	-	-	-
172	Cohasset	2,554	-	-	1	-	2	-	-	-	-	-	1	-
173	Hanover	2,528	1	-	-	-	-	-	-	-	-	-	-	-
174	TOWNS UNDER 2,500.	206,170	12	1	386	-	243	13	3	-	29	-	77	-
175	Scituate	2,467	-	-	-	-	4	-	-	-	-	-	5	-
176	Sharon	2,467	-	-	7	-	4	-	-	-	4	-	-	-
177	Kingston	2,465	-	-	-	-	1	-	-	-	-	-	-	-
178	Bourne	2,455	-	-	-	-	5	-	-	-	1	-	2	-
179	Sutton	2,446	-	-	5	-	5	-	-	-	-	-	-	-
180	Ashland	2,435	1	-	1	-	2	-	-	-	1	-	-	-
181	North Brookfield	2,433	-	-	-	-	9	2	-	-	-	-	-	-
182	Lenox	2,401	-	-	-	-	1	-	-	-	-	-	-	-
183	Lancaster	2,396	-	-	1	-	1	-	1	-	-	-	3	-
184	Millville	2,337	-	-	-	-	-	-	-	-	-	-	-	-
185	Pepperell	2,273	-	-	1	-	-	-	-	-	-	-	2	-
186	Shirley	2,265	-	-	11	-	2	1	-	-	-	-	-	-
187	Norton	2,262	-	-	-	-	2	-	-	-	-	-	-	-
188	Weston	2,250	-	-	2	-	5	-	-	-	-	-	-	-
189	Swansea	2,217	-	-	-	-	2	-	-	-	-	-	-	-
190	Manchester	2,214	1	-	1	-	2	-	-	-	-	-	1	-
191	Merrimac	2,211	-	-	-	-	-	-	-	-	-	-	1	-
192	Hopkinton	2,192	-	-	-	-	-	-	-	-	-	-	-	-
193	Avon	2,181	-	-	45	-	3	-	-	-	-	-	-	-
194	Douglas	2,181	-	-	5	-	1	-	-	-	-	-	1	-
195	Bellingham	2,180	-	-	-	-	9	-	-	-	-	-	1	-
196	Acton	2,167	-	-	30	-	-	-	-	-	1	-	1	-
197	Groton	2,108	-	-	9	-	-	-	-	-	-	-	-	-
198	Belchertown	2,056	-	-	-	-	5	-	-	-	-	-	-	-
199	Ashburnham	1,987	-	-	-	-	-	-	-	-	-	-	-	-
200	Rehoboth	1,980	-	-	3	-	-	-	-	-	-	-	-	-
201	Georgetown	1,976	-	-	-	-	1	-	-	-	-	-	-	-
202	Hanson	1,970	-	-	-	-	-	-	-	-	-	-	-	-
203	Wayland	1,883	-	-	-	-	2	-	-	-	1	-	3	-
204	Charlton	1,880	-	-	-	-	-	-	-	-	-	-	-	-
205	Southborough	1,806	-	-	-	-	1	-	-	-	-	-	-	-
206	West Boylston	1,784	-	-	22	-	-	-	-	-	1	-	2	-
207	Chatham	1,774	1	-	1	-	2	-	-	-	1	-	1	-
208	Northfield	1,772	-	-	8	-	1	-	-	-	4	-	1	-
209	Williamsburg	1,734	-	-	-	-	4	-	1	-	1	-	-	-
210	Northborough	1,730	-	-	-	-	3	-	-	-	-	-	1	-
211	Andover	1,693	-	-	-	-	7	-	-	-	-	-	1	-
212	Stockbridge	1,692	-	-	51	-	1	-	-	-	1	-	-	-
213	Harwich	1,671	-	-	1	-	-	-	-	-	-	-	2	-
214	Rutland	1,663	-	-	-	-	-	-	-	-	-	-	1	-
215	Lunenburg	1,647	-	-	-	-	1	-	-	-	-	-	-	-
216	Raynham	1,635	-	-	-	-	3	1	-	-	-	-	-	-
217	Sturbridge	1,550	-	-	1	-	1	-	-	-	-	-	-	-
218	Upton	1,513	-	-	-	-	1	-	-	-	-	-	-	-
219	Millis	1,508	-	-	-	-	-	-	-	-	-	-	1	-
220	Hamilton	1,501	-	-	3	-	1	-	-	-	-	-	3	-
221	Hull	1,498	-	-	1	-	7	-	-	-	-	-	-	-
222	Colrain	1,490	-	-	-	-	2	-	-	-	-	-	-	-
223	Sherborn	1,486	-	-	-	-	-	-	-	-	-	-	13	-
224	West Newbury	1,472	-	-	17	-	21	1	-	-	-	-	-	-
225	Freetown	1,464	-	-	-	-	1	1	-	-	-	-	-	-
226	Townsend	1,450	-	-	-	-	-	-	-	-	-	-	-	-
227	Cheshire	1,446	-	-	-	-	2	-	-	-	-	-	1	-
228	Sandwich	1,436	-	-	-	-	5	-	-	-	-	-	-	-
229	Huntington	1,425	-	-	-	-	1	-	-	-	-	-	-	-

to the Public Health, 1922 — Continued.

11		101		7		13		40A		8		38		31, 37 37A, 37B		32-36E		1		9		Line No.
Influenza.		Lobar Pneumonia.		Measles.		Mumps.		Ophthalmia Neonatorum.		Scarlet Fever.		Syphilis.		Tuberculosis, Pulmonary.		Tuberculosis, Other Forms.		Typhoid Fever.		Whooping Cough.		
Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	
-	-	-	1	58	1	-	-	-	-	7	-	-	-	3	3	-	1	-	-	-	-	169
6	-	-	1	6	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	170
-	-	3	2	8	-	-	-	-	-	2	-	-	-	8	-	-	-	-	-	-	-	171
1	2	-	1	2	-	-	-	-	-	26	-	1	-	3	1	-	1	-	-	-	-	172
527	43	111	111	1025	7	251	-	16	-	326	6	20	6	197	437	12	17	32	4	277	6	174
-	-	2	1	36	-	-	-	-	-	6	-	-	-	6	-	-	-	-	-	-	-	175
33	1	-	2	2	-	6	-	-	-	5	1	-	-	5	4	-	-	-	-	4	-	176
2	-	-	-	-	-	-	-	-	-	11	1	1	-	1	1	-	-	3	-	-	-	177
-	-	4	1	2	-	-	-	-	-	5	-	-	1	8	10	-	-	-	-	-	-	178
1	-	-	2	2	-	3	-	-	-	11	2	-	-	1	2	-	-	-	-	1	-	179
-	-	2	2	2	-	-	-	-	-	2	-	-	-	2	1	-	-	-	-	-	-	180
1	1	1	1	2	-	-	-	-	-	3	-	-	-	3	2	-	-	-	-	-	-	181
3	1	6	1	1	-	3	-	-	-	15	-	-	-	3	2	-	-	-	-	-	-	182
-	-	2	1	1	-	-	-	-	-	4	-	-	-	5	2	-	-	-	-	-	-	183
-	-	-	3	1	-	-	-	-	-	-	-	-	-	2	3	-	-	-	-	-	-	184
-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	2	-	-	-	-	-	-	185
5	-	-	2	-	-	-	-	-	-	7	-	-	-	1	2	-	2	-	-	24	-	186
14	-	3	1	45	-	2	-	-	-	5	-	-	-	1	1	1	2	-	-	2	-	187
-	-	2	-	42	-	-	-	-	-	6	-	-	-	2	3	-	-	-	-	-	-	188
3	-	3	2	128	-	1	-	-	-	3	-	-	-	-	4	-	2	-	-	14	-	189
4	-	4	-	2	-	1	-	1	-	-	-	-	-	-	-	-	-	2	1	13	-	190
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-	1	1	2	1	1	-	-	-	-	-	-	1	-	1	1	-	-	-	-	-	-	194
-	-	-	-	8	-	-	-	-	-	1	-	-	-	2	-	-	-	1	-	2	-	195
-	-	-	2	-	-	-	-	-	-	6	-	1	-	-	5	-	1	-	2	-	-	196
5	1	-	-	12	-	-	-	-	-	-	-	-	-	4	3	-	-	-	-	-	-	197
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1	-	1	1	37	-	-	-	-	-	9	-	-	-	4	2	-	-	3	1	1	-	199
-	-	-	1	-	-	1	-	1	-	-	-	-	-	2	1	-	-	-	-	-	-	200
-	2	-	1	14	-	1	-	-	-	10	1	-	-	2	1	-	-	-	-	1	-	201
-	-	-	1	43	-	1	-	-	-	-	-	-	-	17	41	-	-	1	-	1	-	202
1	1	1	2	1	-	3	-	-	-	1	-	-	-	1	1	-	-	-	-	3	-	203
2	-	2	-	-	-	13	-	-	-	2	-	-	-	-	-	-	-	-	-	6	-	204
-	-	-	2	4	-	-	-	-	-	19	-	-	-	-	1	-	-	1	1	3	-	205
-	-	-	3	8	-	-	-	-	-	-	-	-	-	3	1	-	-	-	-	-	-	206
-	1	3	1	-	-	-	-	-	-	5	-	-	-	1	1	-	-	1	-	-	-	207
-	-	1	1	-	-	-	-	-	-	-	-	-	-	2	-	-	2	-	-	-	-	208
-	-	1	1	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	-	-	-	209
-	-	1	1	4	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	1	-	210
1	2	3	1	5	2	7	-	-	-	1	-	-	-	1	2	-	-	1	-	2	-	211
-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	78	-	1	-	-	-	-	212
1	-	1	1	1	-	7	-	-	-	5	-	-	-	3	2	-	-	-	-	16	-	213
-	-	-	-	-	-	-	-	-	-	2	-	-	-	3	1	-	-	-	-	-	-	214
-	-	1	1	7	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	215
-	-	1	1	-	-	2	-	-	-	-	-	-	-	-	1	-	-	-	-	2	-	216
-	1	-	-	13	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	217
-	-	-	-	7	-	-	-	-	-	2	-	-	-	-	2	-	-	-	-	-	-	218
42	1	-	1	64	-	2	-	1	-	-	-	-	-	-	-	-	-	2	-	8	-	219
-	-	-	1	4	-	-	-	-	-	7	-	-	-	3	2	-	-	-	-	-	-	220
7	-	-	2	1	-	-	-	-	-	2	-	13	-	1	1	-	-	-	-	-	-	221
14	1	3	3	-	-	62	-	-	-	1	-	-	-	1	1	1	1	-	-	6	-	222
-	-	1	1	3	-	-	-	-	-	5	-	-	-	-	-	-	-	-	-	-	-	223
3	1	3	1	3	-	-	-	1	-	3	-	-	-	1	3	1	-	1	-	-	-	224
-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	225
-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	3	1	-	-	-	-	-	226
-	-	-	-	-	-	-	-	-	-	4	1	-	-	-	-	-	-	-	-	2	-	227
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	228
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	229

Cases and Deaths from Diseases Dangerous

Line No.	CITIES AND TOWNS GROUPED IN ORDER OF POPULATION.	Popu- lation esti- mated as of July 1, 1922.	22		25A		10		24		25B		40	
			An- terior Polio- mye- litis.		Chicken Pox.		Diph- theria.		Ep. Cere- bro- spinal Menin- gitis.		Ger- man Meas- les.		Gonor- rhea.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
230	Shelburne	1,411	-	-	-	-	2	1	-	-	-	-	-	-
231	Brookfield	1,399	-	-	24	-	-	-	-	-	-	-	-	-
232	Dennis	1,386	4	1	-	-	-	-	-	-	-	-	1	-
233	Lakeville	1,382	-	-	-	-	-	-	-	-	-	-	-	-
234	Essex	1,373	-	-	-	-	2	-	-	-	-	-	-	-
235	Pembroke	1,368	-	-	-	-	-	-	-	-	-	-	-	-
236	Erving	1,362	-	-	1	-	13	-	-	-	-	-	-	-
237	Buckland	1,361	-	-	-	-	2	-	-	-	1	-	-	-
238	Duxbury	1,360	-	-	4	-	1	-	-	-	-	-	2	-
239	Bedford	1,360	-	-	-	-	-	-	-	-	3	-	1	-
240	Plainville	1,343	-	-	-	-	2	-	-	-	-	-	-	-
241	Westwood	1,311	-	-	-	-	-	-	-	-	-	-	-	-
242	Russell	1,307	-	-	-	-	-	-	-	-	-	-	1	-
243	Littleton	1,302	-	-	2	-	4	-	-	-	-	-	-	-
244	Whately	1,294	-	-	1	-	4	-	-	-	-	-	-	-
245	Sunderland	1,294	-	-	2	-	-	-	-	-	-	-	-	-
246	Nahant	1,283	-	-	-	-	2	-	-	-	-	-	-	-
247	North Reading	1,283	-	-	-	-	-	-	-	-	-	-	-	-
248	Chester	1,280	-	-	-	-	1	-	-	-	-	-	1	-
249	West Brookfield	1,278	-	-	7	-	-	-	-	-	-	-	1	-
250	Sterling	1,253	-	-	14	-	-	-	-	-	-	-	-	-
251	Tisbury	1,250	-	-	1	-	-	-	-	-	-	-	2	-
252	Mattapoisett	1,237	-	-	-	-	-	-	-	-	-	-	-	-
253	Norwell	1,235	-	-	2	-	-	-	-	-	-	-	-	-
254	Westminster	1,211	-	-	-	-	-	-	-	-	-	-	1	-
255	Sheffield	1,210	-	-	-	-	-	-	-	-	-	-	-	-
256	Marshfield	1,197	-	-	3	-	-	-	-	-	-	-	3	-
257	Lynnfield	1,193	1	-	-	-	-	-	-	-	-	-	-	-
258	Marion	1,183	-	-	2	-	15	-	-	-	-	-	6	-
259	Newbury	1,153	-	-	3	-	5	1	-	-	-	-	-	-
260	Clarksburg	1,148	-	-	1	-	1	1	-	-	-	-	-	-
261	Edgartown	1,145	-	-	10	-	3	1	-	-	-	-	3	-
262	Middleton	1,135	-	-	-	-	1	1	-	-	-	-	1	-
263	Yarmouth	1,132	1	-	-	-	2	-	-	-	-	-	1	-
264	Rowley	1,129	-	-	1	-	12	1	-	-	-	-	-	-
265	Southwick	1,104	-	-	-	-	3	1	-	-	-	-	-	-
266	Wenham	1,102	-	-	-	-	4	1	-	-	-	-	-	-
267	Norfolk	1,102	-	-	-	-	2	-	-	-	-	-	-	-
268	Stow	1,088	-	-	-	-	-	-	-	-	-	-	-	-
269	Tyngsborough	1,084	-	-	2	-	6	-	-	-	1	-	-	-
270	Sudbury	1,076	-	-	-	-	-	-	-	-	-	-	-	-
271	Lanesborough	1,036	-	-	-	-	1	-	-	-	-	-	-	-
272	Hubbardston	1,025	-	-	-	-	-	-	-	-	4	-	-	-
273	New Marlborough	1,000	-	-	22	-	-	-	-	-	-	-	-	-
274	Rochester	987	-	-	-	-	2	-	-	-	-	-	-	-
275	Mendon	976	-	-	-	-	1	-	-	-	-	-	-	-
276	Hinsdale	965	-	-	-	-	3	-	-	-	-	-	-	-
277	Burlington	955	-	-	-	-	-	-	-	-	-	-	-	-
278	West Stockbridge	943	-	-	-	-	-	-	-	-	-	-	-	-
279	Oak Bluffs	942	-	-	-	-	-	-	-	-	-	-	-	-
280	Orleans	932	1	-	-	-	-	-	-	-	-	-	-	-
281	Berkley	910	-	-	-	-	-	-	-	-	-	-	-	-
282	Lincoln	902	-	-	9	-	-	-	-	-	-	-	-	-
283	East Brookfield	900	-	-	11	-	2	-	-	-	-	-	-	-
284	Berlin	870	-	-	-	-	-	-	-	-	-	-	-	-
285	Gill	842	-	-	3	-	-	-	-	-	1	-	-	-
286	Conway	826	-	-	-	-	1	-	-	-	-	-	-	-
287	Ashfield	804	-	-	-	-	-	-	-	-	-	-	-	-
288	Boylston	799	-	-	-	-	-	-	-	-	-	-	-	-
289	Royalston	797	-	-	-	-	-	-	-	-	-	-	-	-
290	Dover	797	-	-	-	-	-	-	-	-	-	-	-	-
291	Ashby	789	-	-	-	-	1	-	-	-	-	-	1	-
292	Enfield	782	-	-	6	-	-	-	-	-	-	-	-	-
293	Wellfleet	769	-	-	1	-	1	-	-	-	-	-	-	-

Cases and Deaths from Diseases Dangerous

Line No.	CITIES AND TOWNS GROUPED IN ORDER OF POPULATION.	Popu- lation esti- mated as of July 1, 1922.	22		25A		10		24		25B		40	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
294	Bernardston	759	-	-	-	-	-	-	-	-	-	-	-	1
295	Topsfield	757	-	-	-	-	2	-	-	-	-	-	-	1
296	Granby	754	-	-	-	-	3	-	-	-	-	-	-	-
297	Southampton	742	-	-	1	-	3	-	-	-	-	-	-	-
298	Charlemont	720	-	-	-	-	-	-	-	-	-	-	-	-
299	Brimfield	696	-	-	1	-	-	-	-	-	-	-	-	-
300	Bolton	676	-	-	-	-	-	-	-	-	-	-	-	-
301	Leverett	650	-	-	-	-	-	-	-	-	-	-	-	-
302	Brewster	638	-	-	-	-	-	-	-	-	-	-	-	-
303	Princeton	620	-	-	-	-	-	-	-	-	-	-	-	-
304	Hampden	599	-	-	-	-	-	-	-	-	-	-	-	1
305	Petersham	597	-	-	-	-	-	-	-	-	-	-	-	-
306	Granville	588	-	-	-	-	-	-	-	-	-	-	-	-
307	Richmond	559	-	-	-	-	-	-	-	-	-	-	-	-
308	Dana	539	-	-	-	-	-	-	-	-	2	-	-	-
309	Boxford	523	-	-	-	-	-	-	-	-	-	-	-	-
310	Halifax	523	-	-	-	-	-	-	-	-	-	-	-	-
311	Becket	517	-	-	-	-	-	-	-	-	-	-	-	-
312	Pelham	505	-	-	-	-	1	-	-	-	-	-	-	-
313	Paxton	499	-	-	-	-	-	-	-	-	-	-	-	-
314	Truro	497	-	-	-	-	-	-	-	-	-	-	-	-
315	Carver	466	-	-	-	-	1	-	-	-	-	-	-	-
316	Wales	462	-	-	-	-	-	-	-	-	-	-	-	-
317	Oakham	452	-	-	-	-	-	-	-	-	-	-	-	-
318	New Salem	452	-	-	-	-	-	-	-	-	-	-	-	-
319	Carlisle	448	-	-	-	-	1	-	-	-	-	-	-	-
320	Hancock	439	-	-	-	-	-	-	-	-	-	-	-	-
321	Windsor	418	-	-	-	-	-	-	-	-	-	-	-	-
322	Sandisfield	405	-	-	-	-	-	-	-	-	-	-	-	-
323	Blandford	404	-	-	-	-	-	1	-	-	-	-	-	-
324	Plympton	401	-	-	-	-	-	-	-	-	-	-	-	-
325	Cummington	399	-	-	-	-	-	-	-	-	-	-	2	-
326	Savoy	391	-	-	-	-	-	-	-	-	-	-	-	-
327	Greenwich	384	-	-	-	-	-	-	-	-	-	-	-	-
328	Chesterfield	379	-	-	-	-	-	-	-	-	-	-	-	-
329	Eastham	370	1	-	-	5	-	-	-	-	-	-	-	-
330	Hawley	370	-	-	-	-	-	-	-	-	-	-	-	-
331	New Braintree	364	-	-	-	-	-	-	-	-	-	-	-	-
332	Egremont	358	-	-	-	-	-	-	-	-	-	-	-	-
333	Dunstable	348	-	-	-	-	-	-	-	-	-	-	-	-
334	Phillipston	336	-	-	-	-	-	-	-	-	-	-	-	-
335	Wendell	324	-	-	-	-	-	-	-	-	-	-	-	-
336	Leyden	323	-	-	-	-	-	-	-	-	-	-	-	-
337	Otis	319	-	-	-	-	-	-	-	-	-	-	-	-
338	Plainfield	310	-	-	-	-	-	-	-	-	-	-	-	-
339	Worthington	299	-	-	-	-	-	-	-	-	-	-	-	-
340	West Tisbury	295	-	-	-	4	-	-	-	-	-	-	-	-
341	Heath	295	-	-	-	-	-	-	-	-	-	-	-	-
342	Rowe	285	-	-	-	-	-	-	-	-	-	-	-	-
343	Boxborough	283	-	-	-	-	-	-	1	-	-	-	-	-
344	Middlefield	257	-	-	-	-	-	-	-	-	-	-	-	-
345	Warwick	249	-	-	-	-	-	-	-	-	-	-	-	-
346	Monterey	242	-	-	-	-	-	-	-	-	1	-	-	-
347	Westhampton	240	-	-	-	-	1	-	-	-	-	-	-	-
348	Alford	236	-	-	-	-	-	-	-	-	-	-	-	-
349	Tyringham	235	-	-	-	-	-	-	-	-	-	-	-	-
350	Mashpee	232	-	-	-	-	-	-	-	-	-	-	-	-
351	Florida	231	-	-	-	-	2	-	-	-	-	-	-	-
352	Montgomery	229	-	-	-	-	-	-	-	-	-	-	-	-
353	Washington	222	-	-	-	-	-	-	-	-	-	-	-	-
354	Shutesbury	217	-	-	-	17	-	-	-	-	-	-	-	-
355	Chilmark	215	1	-	-	-	-	-	-	-	-	-	-	-
356	Prescott	203	-	-	-	-	-	-	-	-	-	-	-	-
357	Goshen	189	-	-	-	-	-	-	-	-	-	-	-	-

to the Public Health, 1922 — Continued.

[illegible]

Cases and Deaths from Diseases Dangerous

Line No.	CITIES AND TOWNS GROUPED IN ORDER OF POPULATION.	Popu- lation esti- mated as of July 1, 1922.	22		25A		10		24		25B		40	
			Ant- erior Polio- mye- litis.	Chicken Pox.	Diph- theria.	Ep. Cere- bro- spinal Menin- gitis.	Ger- man Meas- les.	Gonor- rhea.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
358	Tolland	189	-	-	-	-	-	-	-	-	-	-	-	-
359	Holland	150	-	-	-	-	-	-	-	-	-	-	-	-
360	New Ashford	129	-	-	-	-	-	-	-	-	-	-	-	-
361	Gay Head	129	-	-	-	-	-	-	-	-	-	-	-	-
362	Peru	124	-	-	-	-	-	-	-	-	-	-	-	-
363	Gosnold	119	-	-	-	-	-	-	-	-	-	-	-	-
364	Monroe	108	-	-	-	-	-	-	-	-	-	-	-	-
365	Mount Washington	61	-	-	-	-	-	-	-	-	-	-	-	-
366	Tewksbury State Infirmary	-	-	-	33	-	17	1	-	-	-	-	13	-

In addition to the above there occurred 3 cases of actinomycosis, with 2 deaths:			14 cases of dysentery, with 10 deaths:		Cases. Deaths.		
Boston	1	1	Adams	1	1		
Brockton	1	-	Boston	5	1		
Chelsea	-	1	Braintree	-	1		
Pepperell	1	-	Cambridge	1	1		
3 cases of anthrax, with 1 death:			Chelsea	2	-		
Boston	1	-	Fall River	1	-		
Peabody	2	1	Ipswich	-	1		
181 cases of dog bite (requiring anti-rabic treatment):			Maynard	1	-		
Arlington	7	-	Melrose	1	-		
Barnstable	2	-	Milton	1	-		
Belmont	3	-	North Adams	-	2		
Beverly	2	-	Salem	-	1		
Billerica	4	-	Springfield	1	-		
Boston	22	-	Stoneham	-	1		
Brookline	3	-	Ware	-	1		
Cambridge	11	-	Worcester	-	1		
Chelmsford	8	-	163 cases of encephalitis lethargica, with 82 deaths:				
Chelsea	2	-	Arlington	1	1		
Dartmouth	1	-	Ayer	1	1		
Fall River	1	-	Beverly	1	1		
Georgetown	1	-	Boston	42	24		
Great Barrington	3	-	Brockton	6	3		
Holyoke	8	-	Brookline	5	1		
Ipswich	2	-	Cambridge	4	-		
Lexington	3	-	Chelsea	4	1		
Lowell	40	-	Danvers	1	-		
Lynn	4	-	Dighton	-	1		
Medford	6	-	Everett	4	1		
Melrose	1	-	Fall River	4	3		
Methuen	2	-	Foxborough	1	-		
Newton	3	-	Frammingham	2	2		
North Attleborough	1	-	Gloucester	1	1		
Pittsfield	1	-	Hanover	-	1		
Plymouth	1	-	Haverhill	2	1		
Rowley	2	-	Holliston	1	-		
Salem	6	-	Ipswich	1	-		
Somerville	1	-	Lawrence	9	3		
South Hadley	3	-	Longmeadow	1	-		
Springfield	1	-	Lynn	9	4		
Stockbridge	3	-	Malden	1	-		
Swampscott	5	-	Marion	1	-		
Warren	3	-	Marlborough	1	-		
Wellesley	4	-	Marshfield	1	-		
Weston	1	-	Medfield	-	1		
Winthrop	6	-	Melrose	1	-		
Worcester	1	-	Methuen	1	-		
Tewksbury State Infirmary	1	-	Millbury	1	-		
			Milton	1	-		
			New Bedford	2	2		

to the Public Health, 1922 — Concluded.

11		101		7		13		40A		8		38		31, 37 37A, 37B		32-36E		1		9		Line No.
Influenza.		Lobar Pneumonia.		Measles.		Mumps.		Ophthalmia Neonatorum.		Scarlet Fever.		Syphilis.		Tuberculosis, Pulmonary.		Tuberculosis, Other Forms.		Typhoid Fever.		Whooping Cough.		
Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	358
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	359
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	360
-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	361
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	362
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	363
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	364
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	365
-	1	24	15	3	-	3	-	-	-	2	1	5	17	57	94	14	4	1	-	39	2	366

Cases.		Deaths.		Cases.		Deaths.	
Newburyport	.	.	5	3	Walpole	.	1
Newton	.	.	2	1	Westfield	.	1
North Brookfield	.	.	1	-	15 cases of pellagra, with 8 deaths:		
Palmer	.	.	-	1	Boston	.	6
Peabody	.	.	3	2	Danvers	.	1
Plymouth	.	.	1	-	Fall River	.	1
Quincy	.	.	2	2	Grafton	.	-
Reading	.	.	1	-	Northampton	.	2
Salem	.	.	3	2	Rockport	.	1
Salisbury	.	.	1	-	Salem	.	1
Somerville	.	.	1	1	Wellesley	.	1
South Hadley	.	.	1	1	Westwood	.	-
Springfield	.	.	3	3	Wrentham	.	2
Taunton	.	.	3	-	2 cases of rabies, with 5 deaths:		
Waltham	.	.	3	4	Boston	.	1
Watertown	.	.	3	-	Lexington	.	-
Webster	.	.	2	1	Malden	.	1
West Boylston	.	.	2	2	Medford	.	1
West Bridgewater	.	.	1	-	123 cases of septic sore throat, with 25 deaths:		
West Springfield	.	.	1	-	Amherst	.	3
Westborough	.	.	-	1	Andover	.	2
Woburn	.	.	1	-	Arlington	.	1
Worcester	.	.	14	6	Attleboro	.	-
42 cases of hookworm:				42	Barnstable	.	3
Boston	.	.	.		Boston	.	43
1 case of leprosy:				-	Bourne	.	1
Cambridge	.	.	1	-	Brookton	.	1
48 cases of malaria, with 4 deaths:				21	Brookline	.	2
Boston	.	.	.		Cambridge	.	4
Brockton	.	.	1	-	Chatham	.	-
Cambridge	.	.	1	-	Chicopee	.	1
Dartmouth	.	.	1	-	Clinton	.	1
Douglas	.	.	1	-	Eastham	.	1
Everett	.	.	1	-	Easton	.	1
Fall River	.	.	2	-	Everett	.	-
Framingham	.	.	1	-	Fall River	.	6
Hadley	.	.	2	-	Fitchburg	.	1
Haverhill	.	.	1	-	Greenfield	.	2
Holyoke	.	.	1	-	Harwich	.	7
Lowell	.	.	2	2	Haverhill	.	4
Malden	.	.	1	-	Holyoke	.	1
Milford	.	.	3	1	Leominster	.	4
New Bedford	.	.	1	-	Lowell	.	1
Newburyport	.	.	1	-	Lunenburg	.	1
Northampton	.	.	1	-	Lynn	.	1
Pittsfield	.	.	1	-	Medford	.	1
Upton	.	.	-	1	New Bedford	.	6
Uxbridge	.	.	3	-	Northampton	.	1

	Cases.	Deaths.		Cases.	Deaths.
Norwood	2	-	Pittsfield	1	2
Pittsfield	-	1	Salem	1	1
Plymouth	1	-	Sandwich	1	-
Provincetown	1	-	Upton	1	-
Salem	3	-	Worcester	3	1
Sharon	1	-			
Shelburne	1	-	96 cases of trachoma:		
Somerville	4	-	Acton	1	-
Southwick	-	1	Belmont	1	-
Springfield	2	-	Billerica	1	-
Topsfield	1	-	Boston	51	-
Wellesley	1	-	Brockton	2	-
Westford	2	-	Cambridge	8	-
Weston	1	-	Canton	2	-
Whitman	2	-	Chelsea	1	-
Winchester	1	-	Easton	1	-
			Everett	1	-
2 cases of smallpox:			Fall River	1	-
Hadley	1	-	Fitchburg	1	-
Milford	1	-	Lawrence	2	-
			Lowell	4	-
33 cases of tetanus, with 23			Lynn	4	-
deaths:			Medway	2	-
Attleboro	1	1	Melrose	1	-
Beverly	1	1	New Bedford	1	-
Blackstone	-	1	Newton	1	-
Boston	8	6	Norwood	2	-
Brockton	1	2	Peabody	1	-
Dartmouth	1	-	Plymouth	1	-
East Bridgewater	1	-	Somerville	2	-
Fall River	1	1	Walpole	1	-
Gloucester	1	1	Woburn	1	-
Haverhill	1	-	Worcester	1	-
Hingham	1	-	Tewksbury State Infirmary	1	-
Holyoke	-	1			
Leominster	2	1	19 cases of trichinosis, with 4		
Lowell	1	2	deaths:		
Lynn	1	1	Boston	13	4
Marlborough	1	-	Brookline	1	-
Melrose	1	-	Holyoke	3	-
Milford	1	-	Northampton	1	-
Northampton	1	1	Stoughton	1	-
Peabody	1	-			

REPORT OF THE DIVISION OF BIOLOGIC LABORATORIES.

I. ANTITOXIN AND VACCINE LABORATORY.

The activities of this laboratory may be best discussed under the following headings:—

1. Production and distribution.
2. Improvements —
 - (a) In plant and equipment.
 - (b) In methods and production.
3. Expenses.
4. Personnel.
5. Educational activities.
6. Needs.

1. *Production and Distribution.*

The accompanying table shows the amounts of the various biologic products distributed during the fiscal years 1920, 1921 and 1922:—

PRODUCT.	1920.	1921.	1922.
1. Diphtheria Antitoxin: Distributed (1,000 unit doses)	218,227	261,024	336,730
2. Antimeningococcic Serum: Distributed (Doses)	3,585	3,444	4,296
3. Antipneumococcic Serum: Distributed (Doses)	444	649	721
4. Smallpox Vaccine: Distributed (Capillary tubes)	189,064	197,733	189,215
5. Typhoid-Paratyphoid Vaccine: Distributed (Doses)	49,191	55,804	66,959
6. Schick Outfits: Distributed (Doses)	3,150	54,750 ¹	161,750 ¹
7. Diphtheria Toxin for Schick Test: Distributed (c.c. in bulk)	—	32	155½
8. Diphtheria Toxin-Antitoxin Mixture: Distributed (Doses)	3,614	9,414	96,407
9. Normal Serum: Distributed (c.c.)	—	9,788	4,665

¹ One outfit equals 50 doses.

(a) *Diphtheria Antitoxin.*—One of the most gratifying features of the work of the past year has been the greatly increased demand for diphtheria antitoxin. The amount distributed in 1922 represents approximately a 29 per cent addition to the amount distributed in 1921, and it is reasonable to assume that this large increase in distribution represents its more general use by physicians, and that the results of its more widespread utilization are reflected in the lowered death rate and fatality rate from this disease for the past year.

(b) *Antimeningococcic Serum.*—There has been a 25 per cent increase in the amount of antimeningococcic serum distributed although there has been no unusual number of cases of this disease during the past year. It is felt that the larger amount of this product distributed shows a greater interest on the part of physicians in the use of biologic products.

(c) *Antipneumococcic Serum*. — The steady increase in the use of this product would seem to justify the plan which was inaugurated in 1920 of limiting its distribution to only those physicians who have their cases typed, and who are familiar with the proper method of administering this serum. Although the serum treatment of lobar pneumonia by no means gives as satisfactory results as does the treatment of diphtheria with antitoxin, yet the reports received from many physicians in private practice and the constantly growing demand for this serum warrant its continued production and distribution.

(d) *Smallpox Vaccine Virus*. — There are slightly yearly variations in the amount of smallpox vaccine distributed, with a slightly smaller amount in 1922 than in 1921. In this connection, it should be noted that this year there has been a smaller number of returns than previously, and, furthermore, during the past eighteen months the vaccine virus has been prepared in more concentrated form.

(e) *Bacterial Vaccine made from Typhoid and Paratyphoid A and B Bacilli*. — There has been a steady increase in the distribution of typhoid-paratyphoid vaccine, presumably due to its more extensive adoption in institutions.

(f) *Schick Outfits and Diphtheria Toxin-Antitoxin Mixture*. — The noteworthy increase in the amounts of these two products distributed is due to the widespread interest in diphtheria prevention work, which has been stimulated throughout the state by means of the campaign carried on by this department. It is the great increase in the distribution of these two products which, on account of the large number of containers and labels and the materials and labor necessitated, has added considerably to the increased expenses.

2. Improvements.

(a) *Plant and Equipment*. — During the past year new apparatus has been acquired which materially cuts down the amount of labor necessitated, particularly in the making of media and in the production of diphtheria toxin. Some of the laboratory rooms and all rooms in the stable have been painted, adding greatly to the appearance and cleanliness of the plant.

(b) *Methods and Production*. (1) *Immunizing of Horses*. — An investigation has been and is being carried on as to the most efficient methods for immunizing horses for the production of diphtheria antitoxin. The scheme of injections has been modified with a view to producing high potency antitoxin with the smallest possible doses of diphtheria toxin. The antitoxin yielded by all the horses during the past year has averaged about 440 units per cubic centimeter against about 230 units per cubic centimeter in 1919. This increase has made it possible to prepare and distribute this year approximately twice the amount of antitoxin prepared and distributed in 1919 from the same number of horses used in 1919. The advantages of the method as developed include the saving in money effected by the use of about one-half the toxin usually employed, and the better physical condition maintained by the horses, in addition to the higher potency of the serum produced.

(2) *Concentration of Antitoxin*. — The greater activity in the concentration department has made it possible to concentrate a sufficient amount of antitoxin for all the 3,000, 5,000 and 10,000 unit packages. With the higher potency plasma available it has been possible to produce a finished product which is constantly higher in potency than any lots heretofore produced. Whereas the concentrated antitoxin in 1919 and 1920 had a titre of 250 to 500 units per cubic centimeter, the lots now produced average well above 1,000 units per cubic centimeter and the titre is being constantly raised.

(3) *Vaccine Virus*. — Through the use of larger calves and by the vaccination of a larger skin area, the yield of vaccine virus has been markedly increased at a comparatively small addition in cost. By sending out the vaccine virus in more concentrated form, the use of this product has resulted in practically 100 per cent of "takes;" and in those rare instances where a failure to "take" has been reported, the fault has been found to lie elsewhere than in the potency of the product.

(4) *Schick Outfits*. — The Schick outfit has been improved and simplified. A new capillary tube insuring a more exact dilution of the toxin has been adopted, and a further improvement has been made in abandoning the inclusion of capillary tubes of heated toxin for the control and substituting a vial of already diluted heated diphtheria toxin. The circular of directions for this product has also been revised. In order to insure greater accuracy in the amounts of toxin contained in the capillary tube, a new apparatus for filling these tubes with toxin has been installed. The desired amount is expelled from a syringe by means of a micrometer screw, and from this apparatus there is an error of less than 1 per cent in the amount of toxin delivered. This work is entrusted only to the most highly trained workers in the laboratory. Since August, 1922, samples from every lot of Schick outfits have been sent to the Hygienic Laboratory for potency and purity tests and on November 1, 1922, the U. S. Public Health Service began the licensing of the production of diphtheria toxin for Schick outfits. It is gratifying to be able to state that every lot of Schick toxin submitted for federal test has been approved by the United States Hygienic Laboratory.

(5) *Diphtheria Toxin-Antitoxin Mixture*. — A new and improved method of mixing diphtheria toxin-antitoxin mixture has been adopted, insuring accuracy of measurement and freedom from any possible contamination. Only the most potent lots of toxin available have been used in these mixtures and we have been fortunate in having toxins with an L+ dose of not over 0.17 c.c. for making all lots distributed. The use of this high potency toxin results in having less broth, and, therefore, less bacterial protein in the mixture, thereby reducing the number of local or constitutional reactions following the administration of this product. The reports show that the number of reactions following the use of toxin-antitoxin mixture distributed from this laboratory is practically negligible. On the recommendation of Park, some trial lots of toxin-antitoxin containing 1/10 L+ dose of toxin per c.c. have been made and will shortly be ready for distribution. Such mixtures have the advantage of having a much smaller content of nitrogenous substances, and, therefore, can be administered to adults without eliciting constitutional reactions.

3. Expenses.

A table showing the comparative amounts spent for personal services and expenses in 1920, 1921 and 1922 follows: —

	1920.	1921.	1922.
Personal Services	\$23,094 16	\$28,610 41	\$30,690 50
Expenses	23,742 37	24,500 46	29,360 80
	\$46,836 53	\$53,110 87	\$60,051 30

Although the appropriation for this division both for personal services and expenses has shown a successive increase for the last three years, it should be pointed out that these increases bear a low ratio to the actual increase in products distributed. A still further increase in the appropriation has been requested in the budget estimate for 1923, and from present indications it is obvious that the amount then requested will be inadequate to carry on the work of the laboratory during the coming year. The constantly growing demand for products, particularly diphtheria antitoxin, Schick outfits and diphtheria toxin-antitoxin mixture will add a considerable sum to the expense account for supplies and containers, and also requires the employment of additional labor. It, therefore, seems inevitable that an increased appropriation both for expenses and personal services will be necessitated early in the year if these augmented demands are to be met.

4. *Personnel.*

Dr. Robert N. Nye took up his duties as Assistant Director of the division on January 1, 1922. During the year he has rendered most valuable services to the laboratory. With his help it has been possible to revise the system of business and laboratory records, and to improve many of the technical procedures connected with the production of serums and vaccines. It is most regrettable that a more attractive appointment elsewhere will deprive the State of Dr. Nye's services early in the coming year. Three laborers, one male and two females, one on a permanent appointment and two on a constant emergency appointment have been added to the force during the past year, and from present indications it will be necessary to add at least two more within the next two months.

5. *Educational Activities.*

More and more the laboratory is fulfilling its desired function as a place of instruction. Foreign students from the International Health Board and students from the School of Public Health and the Medical School of Harvard University have been given instruction in the production of antitoxins, serums and vaccines, and demonstrations have been given to many other student groups. The relationship between this laboratory and the Harvard School of Public Health has been strengthened by the appointment of Doctor White and Doctor Nye to the teaching staff of the school, and the facilities of the laboratory are now being utilized by students of this school in carrying on investigative work.

One of the chief activities of the Director has been the giving of Schick clinics and addresses before school officials, teachers, parent-teachers' associations, medical and other societies, and the public on diphtheria prevention. Forty-four such demonstrations and addresses have been given before audiences totalling 4,105 persons. Assistance has also been given to a number of towns in planning and carrying out diphtheria prevention campaigns. Demonstrations, addresses and assistance have been given in the following towns: Holyoke, Northampton, Chicopee, Springfield, Easthampton, North Adams, New Bedford, Watertown, Quincy, Roslindale, Haverhill, Worcester, Woburn, Arlington, Reading, Milton, Lakeville, Westfield, Amherst, Enfield, Ware and Leominster. It is planned to carry on this service during the coming year. In the Antitoxin and Vaccine Laboratory twenty demonstrations and talks have been given to 416 persons, comprising pupils from medical, and other institutions.

6. *Needs.*

If the greatly increased demand for biologic products is to be met, the following needs must be supplied:—

(1) A larger appropriation for expenses in order to cover the larger amount of chemicals and other supplies, and various containers.

(2) An increased appropriation for personal services both for increases for some of the present members of the staff and for at least two additional helpers.

(3) The most urgent need is the provision of adequate housing for the laboratory. The present building is now crowded to its utmost capacity, both as to the work carried out and the number of workers who can conveniently operate in the present quarters. This need has been forecasted in previous reports, but has now become actual and urgent. Either a sizable addition must be made to the present laboratory building, — provided that its continued occupancy can be assured — or else, a new laboratory building and stable must be erected on some other convenient location. In this case it may not be out of place to anticipate a further possible extension of the laboratory work to include the preparation of tetanus antitoxin, rabies vaccine and possibly tuberculin. It is, of course, impossible with our present laboratory quarters to undertake the preparation of any of these products, but they might well be borne in mind when any building

program is undertaken. If the Antitoxin and Vaccine Laboratory is to continue to increase its service to the Commonwealth, the question of its housing must be met during the coming year.

II. WASSERMANN LABORATORY.

The work of the Wassermann Laboratory for the year 1922 was characterized by a marked increase in the number of tests, and by the trying conditions under which the work was accomplished. Seven employees have resigned during the past fourteen months, while its entire personnel consists of only nine workers. The execution of the regular tests at an increased rate, and the training of new personnel at the same time, has been difficult. The accomplishment of this task was possible through the fine effort of our assistant bacteriologist, Miss Stuart, who has served during the past year without vacation. Furthermore, there has been difficulty in obtaining even untrained workers of suitable calibre at the authorized salaries. Unless the salaries are made comparable with those given for similar duties in other institutions the work will suffer. This of course would be regrettable, when it is considered that the diagnostic procedures of this laboratory are concerned with the control of several important public health diseases, particularly syphilis and rabies.

Syphilis alone helps to fill our municipal and state hospitals, our criminal institutions, and our public and private institutions for the insane, the feeble-minded, and the delinquent. This laboratory cooperates fully with all these, and with the physicians of the Commonwealth, in trying to control this great human scourge. It is obvious that this work cannot be done efficiently or reliably with an inferior personnel.

For the past year and a half rabies has been unusually prevalent among dogs in Massachusetts. The control of this disease is, in a large measure, dependent upon the diagnostic procedures carried on in this laboratory.

Apart from the establishment of positions bearing sufficient compensation to attract and hold reliable workers, it is also necessary to employ an additional stenographer. During the past three years the work has grown from 39,130 to 49,937 tests per year. At the present time an illness of any of the stenographic force for even a few days seriously handicaps the mailing of medical reports to physicians and institutions. The appointment of an additional stenographer is therefore required.

The following table gives a detailed summary of the work and shows its increase during the past five years:—

	1918.	1919.	1920.	1921.	1922.
Wassermann tests	27,534	31,485	36,953	42,679	47,488
Gonococcus fixation tests	—	222	1,726	1,703	1,476
Lange's colloidal gold tests	—	—	—	82	157
Diagnostic examinations for the Division of Animal Industry:					
(a) Complement fixation tests for glanders	646	122	221	125	279
(b) Examinations for rabies	61	84	166	277	482
(c) Pathologic and bacteriologic examinations	45	79	64	50	55
	28,286	31,992	39,130	44,916	49,937

REPORT OF DIVISION OF HYGIENE.

During the fiscal year just passed the Division of Hygiene has approximately doubled its staff and has greatly extended certain branches of its work. In the nature of things this has involved much readjustment and a long look into the future. We have faced the problem of attacking something which has not yet been attacked successfully on a state-wide basis. This task is to reduce the maternal and infant death rate and more particularly that part of the infant death rate which occurs during the first month of life. To try to accomplish this we are extending our maternal and infant hygiene activities; it is this extension of work which made necessary the increase in our staff.

PAST HISTORY.

In a report dealing with the inauguration of new work in maternal and infant hygiene, it would hardly be proper not to refer briefly to the past history of the widespread interest which is clearly to be seen in all parts of the country at the present moment with respect to this subject.

More than six years ago Massachusetts began to study the question of maternity benefits, so-called. Two legislative commissions were appointed and reported on consecutive years. The minority in each case called for some sort of maternity benefit with or without health insurance. In neither instance was the legislature willing to accept the minority report. Then began a series of bills introduced into the legislature which provided for maternity benefits without any health insurance feature. These bills failed of passage. In 1920 the legislature appointed another commission to study the whole question. This commission reported its findings which were based on studies of maternal and infant mortality and recommended a simple system of prenatal, natal and postnatal visiting nursing service to all prospective mothers of the State, as an educational measure. This recommendation was not accepted by the legislature.

In the meantime federal interest had arisen in the subject. The Sheppard-Towner Bill was brought before Congress and after long discussion became an Act. This Act provided for federal contributions of money to states accepting the Act, providing that these states should partly match the federal appropriation. Massachusetts, in common with three other states, decided not to accept the Sheppard-Towner Act. However, the legislature provided an additional appropriation for the Division of Hygiene of the State Department of Public Health in order to enable it to extend its maternal and infant hygiene activities.

INAUGURATION OF THE WORK.

This appropriation was passed the latter part of June and consisted of \$15,000 for the remainder of the fiscal year, with the general understanding that the work would be continued for subsequent years at a corresponding rate, namely, about \$45,000 a year. The Department had long been studying the problem and had a program planned which was ready to be put into immediate operation. This program involves in no sense a change of policy for the Department and is merely an extension of activity which has been carried on in one form or another for many years. It involves no change in the relationship of the Department to local health departments; it involves no maternity benefits in the sense of financial advances to prospective mothers; neither does it involve any system of health insurance. It should further be emphasized that there is in it no measure whatsoever of control of the medical profession or of the nursing profession.

Phases of the Program.

The first phase is that of informational service to the public. It is clearly recognized that there is sufficient medical knowledge available largely to reduce the maternal and infant mortality if it were only taken advantage of by the public at large. The investigation of the Maternity Benefit Commission of 1920 showed conclusively that the chief cause of maternal and infant mortality is ignorance of the laws of hygiene and not poverty, poor housing conditions, or other causes which have in the past been considered to be of the most importance. This being the case, any information which will cause prospective mothers to obtain early and adequate medical attention will, of itself, effect a reduction in mortality and morbidity as well.

For several years the Department has been sending out prenatal and postnatal letters to any one in the state who wished this service, and apparently they have met with marked success. An attempt will be made now to extend this service greatly and to render the letters into various foreign languages in order that all may get the benefit of them. We are now sending out about 5,000 a year. These letters have represented only one way of reaching the public. With the universal interest in moving pictures it is felt that more use will have to be made of this educational method. The newspapers will have to be reached. Much information of use to the public is gladly disseminated free of charge to the newspapers. It is necessary, however, in order to get the most possible out of this type of service, to make use of a certain number of paid advertisements. These have to be simple in character and clear cut. The burden of their advice to prospective mothers should be "Go to your family doctor at the earliest possible moment and carry out his advice faithfully."

In addition to these measures others, such as a breast-feeding campaign, circular letters to physicians and nurses, nutrition classes for prospective mothers, will be made use of.

Investigational.

The first phase of our work which I have outlined is one which can be put into effect at once. The second phase, however, is quite necessary because we realize only too well that we have much yet to learn about the causes of maternal and infant mortality. Our knowledge of this subject can be extended only by painstaking study of all such deaths. This we are endeavoring to carry out through the employment of physicians who will make an accurate study of each maternal death and as many early infant deaths as possible, discussing them with the attending physician and with the hospitals, and looking up the social conditions which surround the families in which such deaths occurred.

Public Health Nursing.

Every one realizes now that the most important adjunct to successful work along the line of maternal and infant hygiene is public health nursing. This type of nursing as applied to the case in hand includes prenatal, maternal and infant hygiene work. As the result of an intensive campaign carried on during Children's Year in the war period, very many new public health nurses were established in the different cities and towns of our state. The type of work, however, carried on by such nurses is not the same everywhere. The endeavors of some are producing results; those of others are not. Some communities are reasonably well supplied with such service for some time to come. Other communities are sadly lacking in facilities for promoting maternal and infant hygiene.

The first task now ahead of public health nursing is for the Department of Public Health to make a careful study of existing activities in the different municipalities in order to see if it may be able to offer advice and assistance to such communities to strengthen their existing work or to establish new work. In order that we may be in a position to do this we are making a careful study of child

hygiene activities of each one of the municipalities in the Commonwealth. When this is done we may properly point out to the authorities of the different towns ways in which the Department can see that their work could be improved and to offer them our assistance. It must be emphasized again that the type of service which the Department offers is not that of many workers who can go into the different communities and do their work for them. Our function under the law is to advise, to assist and to stimulate, but not to take from the individual community its initiative or to carry its responsibility.

Present Force.

In order to carry out the activities which have been briefly outlined above we have taken on the following additional personnel: three physicians, six public health nurses, an assistant editor and lecturer, a statistician, a nutritionist, and a clerical force of seven persons.

In order that the Department may not fail to get the full benefit of the advice of outside agencies interested in this same subject, it has chosen a strong Advisory Committee to assist it in this work. The personnel of this Committee, which is built up from the Child Conservation Committee which functioned during the war, from the Maternity Benefit Commission of 1920, and from representatives of other groups, consists of two pediatricians, an obstetrician, two general practitioners of medicine, a public health nurse, together with others representing various types of social activities.

Expectations as to Accomplishments.

It is hoped through the plans outlined above to do the following things: (1) to study carefully the existing conditions in the different cities and towns which affect the lives and health of mothers and babies; (2) to bring out facts which have hitherto been overlooked; (3) to arouse renewed interest in the different cities and towns both on the part of municipal authorities and on the part of private agencies, which will result in the extension of the excellent measures which many communities now are applying to protect their mothers and babies, and in the inauguration of new work in communities now doing little or nothing in this direction. It is hoped by mobilizing all these forces in the communities and by placing at their service the trained personnel of the State that a reduction can be accomplished in the maternal mortality and the early infant mortality in particular, a thing which has not yet been accomplished on a state-wide basis anywhere in the country.

SCHOOL HYGIENE.

Last year's report chronicled the enactment of a law which made school nursing obligatory throughout the State. The employment of school physicians by cities and towns had apparently been made obligatory in 1906. Although this law was passed in 1906, it was not well observed largely because of the failure to make communities realize the great importance of the medical supervision of the school child. Public opinion in favor of this measure is steadily growing. The results of such growth are seen in the rapid extension of school nursing service after the passage of the law last year. At the present time cities and towns of the State have school nursing service and it seems probable that a very few months will see the whole State completely covered with such service.

School Hygiene Conferences.

It is not sufficient to have each municipality supplied with school nursing service of some sort; it is highly desirable that this service should be of high grade. Of necessity, we have seen many school nurses installed who have had little or no specific training for the job. The law does not specify the qualifications of the nurses. For this reason it seemed best to hold a series of conferences for the pur-

pose of enlightening the new nurses as to their duties and of offering to the more experienced ones an opportunity for a full discussion of their problems. To this end the State Departments of Education and Public Health combined to hold a series of conferences throughout the State. These conferences were held at the State normal schools and were well attended by school nurses, school physicians, school superintendents and members of school committees. Boards of health were included also, where they had the supervision of school hygiene, which is the case in some of our cities.

A striking feature in connection with these school hygiene conferences was the play "The Lion and the Nurse" which was given eleven times, reaching approximately 3,925 persons. The principal lesson taught in this play is the value of school nursing. Incidentally, health habits are taught in an attractive manner.

These conferences have been very successful. The discussions elicited showed very clearly the need thereof. It is felt that a much clearer appreciation will be seen in the future of the laws under which medical supervision of the school child is carried on, and especially a much greater appreciation will be felt of the necessity of cooperation in the different municipalities between school committees and boards of health in order that the best interests of the school children may be subserved. It is planned to continue these conferences next year taking up certain aspects of the problem which were not stressed during the past year.

NUTRITION.

At the present time the Division of Hygiene has two nutritionists. This work was started in 1917. With such a small force as we have it would be impossible to reach large groups of the public excepting through lectures, and written and pictorial material. However, it has been found possible to reach many thousands indirectly through contact with those who, in turn, reach other groups.

Much of the work of our nutritionists consists in consultations with people from the different cities and towns who are desirous of starting new forms of nutrition work such as school lunches or nutrition classes. A great need for this type of work is shown by the reports which come in from all directions indicating that a considerable proportion of the children of the well-to-do and the poor alike is undernourished. In many instances the greater proportion of undernourishment is shown in communities inhabited largely by the well-to-do than is shown amongst the poorer families. It is recognized, of course, that the term "malnutrition" is often loosely used and is made to depend entirely upon the weighing and measuring of the children. This is unfortunate since the relative height and weight of the child with reference to his age is only a rough test and is merely a factor in our estimate of the child's nutrition. It should be emphasized strongly that in order to determine properly the child's nutrition a careful medical examination is necessary. It should be emphasized further that constant medical oversight is necessary if nutrition classes are to be carried on effectively.

The Division of Hygiene hopes to be able to reach larger and larger groups of school nurses and other professional workers interested in the problem of nutrition of the child and is planning a course of study for such groups.

MOUTH HYGIENE.

The mouth hygiene work of the Division has continued this year along the lines laid down in last year's report. A study of the condition of the mouths of school children in different parts of the State is almost completed and will be reported upon shortly. This study indicates clearly the overwhelming need for more attention to the teeth and especially the lack of any satisfactory method of giving dental attention to the children in the rural districts. Traveling dental clinics have proved of great service but apparently do not as yet adequately meet the whole need. It is only fair to say, however, that there is yet much work to be done to convince the average citizen that the teeth of his children and of himself bear a definite relationship to the health of his family. If the average family

realized this truth traveling clinics would not be so necessary since we should find families willing to travel at least as far to get their teeth cared for as they would to buy a cow or see a circus.

Dental Clinics.

In less rural places dental clinics are springing up rapidly, often in towns which have no public health nursing service of any kind. In such cases it would seem as if an error in judgment were being committed since, according to the best opinion of those who have studied the problem, the first public health activity which a town should undertake should be public health nursing. The public health nurse is the general follow-up agent for the whole public health movement, and without follow-up no sort of activity is of much permanent value. Again, in many places there is no adequate appreciation of the fact that the filling of teeth is a form of medical treatment and as such is not in the same category, from the public health point of view, with the instruction which can be given children in the proper care of their teeth and the prevention of dental decay. There are many other interesting and important factors involved in the problem of dental clinics which can not be discussed in a brief report. It should suffice to say that before undertaking new work of this type, towns should understand clearly the obligations involved and should not under the guise of public health furnish people with service which should be obtained at their own expense and through their own initiative.

Mouth Hygiene Exhibit.

Our mouth hygiene exhibit has been added to materially during the past year and is proving of the greatest value. At the annual meeting of the American Dental Association it was considered good enough to be given first prize.

PREVENTION OF CANCER.

The usual appropriation has been expended the past year for the purpose of educating the public to the danger of cancer and also for furnishing free diagnostic service to the physicians and hospitals of the State. The appreciation of this service seems to be increasing as is shown by the gradual increase in number of pathological specimens submitted for examination. The Division of Hygiene has, as in years passed, cooperated with the Massachusetts branch of the American Society for the Control of Cancer, especially during the annual Cancer Week.

EXHIBITS AND HEALTH DAYS.

A number of health days and health weeks have been held as usual throughout the State. There is apparently nothing quite able to take the place of this method of bringing home to the public the truths of public health. It is especially gratifying to note that health days have been held in a number of the smaller towns in the rural parts of the State. It may not be amiss to quote here a statement of one of the Department's District Health Officers with respect to the value of health days in the small towns.

Regarding the value of these health days there is in my mind no question. Conditions in some districts may possibly not be met by this plan of educational work, but I have found that in the western part of the state no other one means of reaching the people is as successful as the holding of such health days. The value received for the amount of time and money put into them is, I believe, in direct proportion to the amount of preparation and publicity given.

Many additions have been made to our exhibit. It is hoped now to build up several sets of posters and other exhibit material which may be used simultaneously in widely separated parts of the State. The need for such duplication is especially evident during the season of the agricultural fairs when our whole exhibit is in

commission at the fairs and so not available for other parts of the State. We find our child hygiene exhibit and the institution of health days of the greatest value in the promotion of our maternal and infant hygiene program. Health exhibits will always be valuable so long as we have people with a distinctively visual imagination who do not learn things readily through lectures. The publicity aroused by a visit of the health exhibit to a town serves to focus upon the subject of health an attention which outlasts the short period of the health day or health week.

LECTURE WORK.

The lecture work of the Division does not loom up so large as in some years chiefly because of the fact that we are gradually developing the more fruitful field of conferences with those in the different municipalities who have in hand definite pieces of work. In other words, to repeat the thought already expressed, we are aiming more and more to reach those who in turn will reach many others. During the past year we gave 479 lectures in 134 different communities throughout the State, to audiences aggregating 40,000 persons.

RADIO TALKS.

The Springfield Westinghouse Company in June, 1922, kindly offered the use of its station to the Department of Public Health for broadcasting health talks every Wednesday evening.

Constant use has been made of this privilege by the Department ever since, with the assurance that an audience was being reached of a size not obtainable in any other way.

NEW LITERATURE.

The Division is undertaking now a critical evaluation of all its written material in order to see if it can be improved materially, and to see if the money allotted for this purpose is being expended as economically as possible. One change has come out of this study. We are now engaged in simplifying the language of these pamphlets and dressing them in more attractive form — something which can be accomplished at no increase of cost. We now realize that we must have two distinct kinds of written material: the one in simple non-technical language intended for the use of the general public; the other in somewhat more technical form intended for the use of those who in turn will serve as teachers. It may be said in a word that we are gradually changing our material in the direction of greater simplicity and greater brevity, to say nothing of the factor of greater attractiveness.

"The Commonhealth."

We have continued the policy of dividing the issues of "The Commonhealth" into approximately two equal divisions, the one devoted to special subjects, and the other to more general ones. Special issues for the year 1922 were the Mental Hygiene Number and the Tuberculosis Number. The "Commonhealth" seems to be meeting a need as is shown by the many letters received expressing appreciation.

Manual of Health Laws.

In accordance with authority granted by the statutes, the Department published this year the "Manual of Laws Relating to the Public Health." There has been no edition of this since 1915. The work of getting out the manual will be much easier in the future owing to the new method inaugurated by the legislature for revising the statutes. The credit for the arduous and painstaking effort involved in producing this manual should go to Dr. Lyman Asa Jones, State District Health Officer for the Northeastern District.

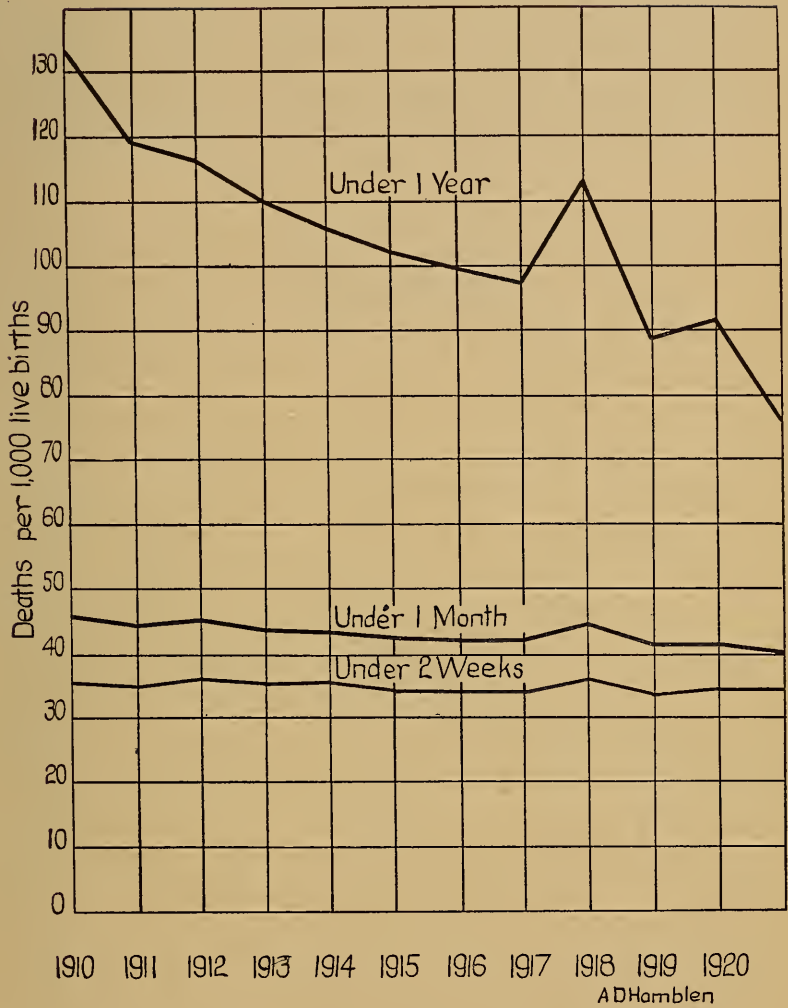
VITAL STATISTICS.

Under the law the collection of vital statistics rests largely in the hands of the Secretary of State. The Division of Hygiene is vitally interested in the statistics of maternal and infant mortality, cancer, and other non-communicable but more or less preventable diseases. Our figures are obtained from the Registrar of Vital Statistics. We have met with the greatest cooperation from him in obtaining the figures that we are so greatly in need of in order to carry on our work intelligently. There is one great handicap, however, under which both the Registrar of Vital Statistics and the Division of Hygiene labor with respect to births and infant deaths. The Secretary of State receives notice of births and deaths from the different city and town clerks throughout the State. This information is often very slow in coming in so that it is practically impossible in this State to figure the infant mortality of a given year until late in the following year. Furthermore, there is no uniformity as to the method in which the local communities register their births and deaths. Some communities, for example, include in their births all children born within the limits of the town during a given year. This, it may be said, is the method used by the State. Other towns include only the births of those belonging in the town and rule out births occurring in the town if the mother is a resident of another town. For this reason in order to have accurate figures the Division of Hygiene is always obliged to wait for the final state returns.

Infant Mortality.

From the point of view of infant mortality, the past year will hardly equal the record of 1921. It will be recalled that there was an extraordinary drop in the infant mortality all over this country in that year. The State of Massachusetts in 1921 reached the lowest mark yet reached in its infant mortality. The drop in some communities was an extraordinary one, so extraordinary that it seems futile to try to explain it on the sole ground of public health activity. Under such circumstances it is only natural to expect a slight increase the following year. As a matter of fact, however, the total infant mortality for the State of Massachusetts is going down slowly but surely. We can not expect that this will continue indefinitely, however, for the following reasons. The greatest improvement in infant mortality has been due to a reduction in diarrhoeal and other infectious diseases—in other words, a reduction in diseases due to poor environmental conditions. The early infant mortality, that is to say, that part of the infant mortality which occurs under one month of age, is not showing a satisfactory decrease. In fact, in most places it is not decreasing at all. Yet this early infant mortality forms from forty to sixty per cent of the total infant mortality. Until we can make more of an impression upon this period of the infant's life we shall not succeed in reducing the infant mortality to the point we have reason to believe it should reach. The accompanying chart shows the fluctuation of the total infant mortality for the State together with the rate under one month and under two weeks.

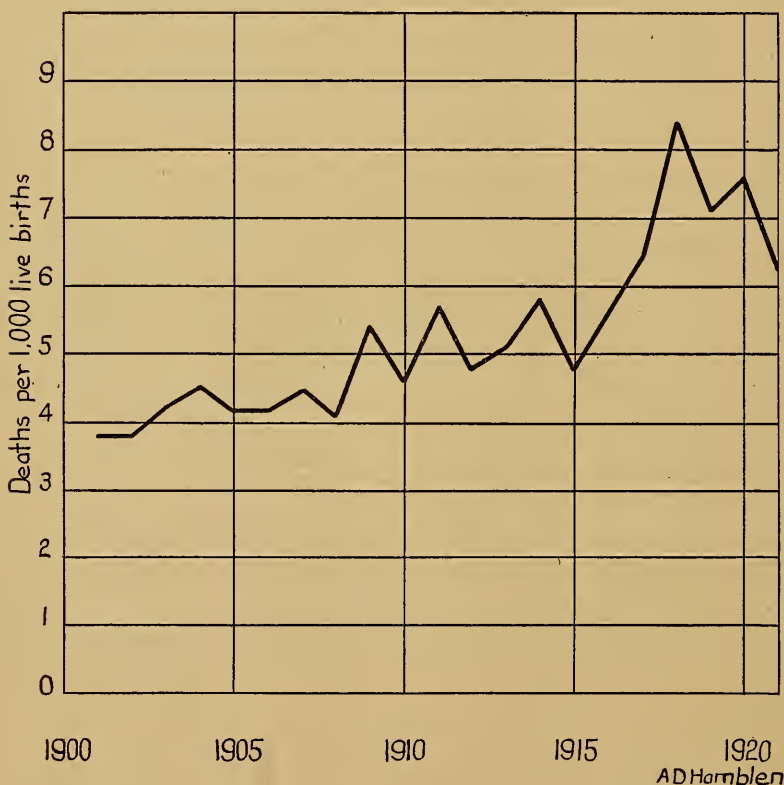
Infant Mortality
Massachusetts



Maternal Mortality.

While there is every reason to believe that maternal mortality during the past year will have receded somewhat from the high peak of the last few years, none the less, we do not see the reduction which we have a right to expect as a result of the improvement in our medical schools and as a result of better nursing service and hospital facilities. There is no question but that we must group together the two problems of maternal mortality and early infant mortality. They are unquestionably bound up with the subject of prenatal and maternal care.

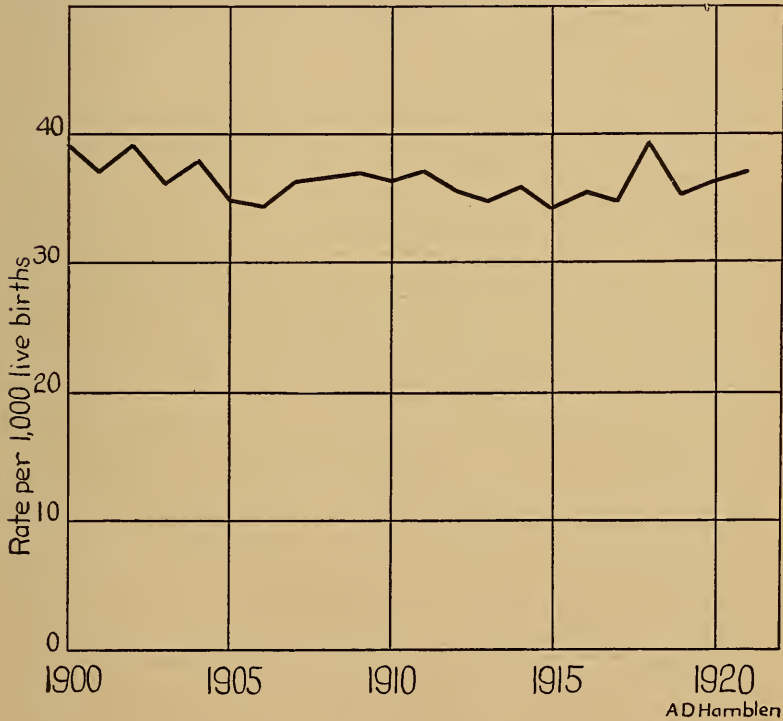
Maternal Mortality
From Diseases Caused by Pregnancy and Confinement
Massachusetts



Stillbirths and Premature Births.

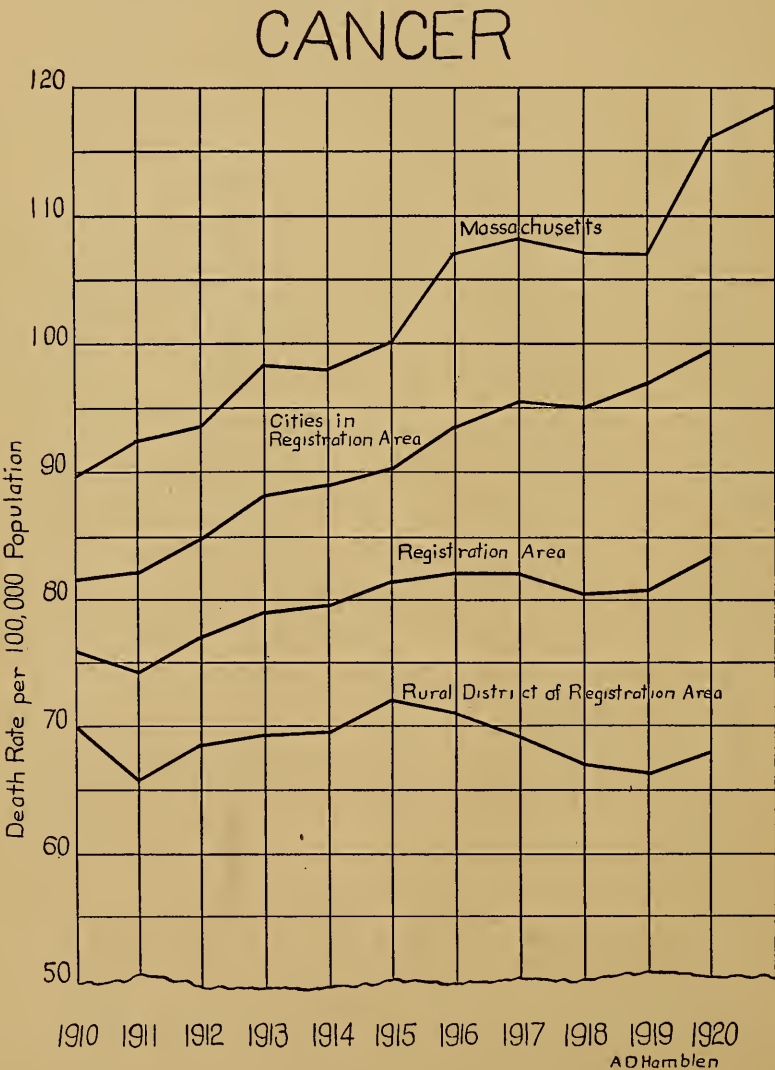
Very few people realize the significance of the stillbirth rate. The infant mortality is calculated, of course, on the basis of live births. Yet our stillbirth rate comes only too close to the death rate of infants under one month of age. Furthermore it remains at a pretty constant level year after year. The same is true of premature births. There is much confusion in the minds of layman and physician alike as to what really constitutes a premature birth but from the best figures we can obtain it is quite evident that here we have a real problem which challenges the best thought of the medical profession.

Stillbirths
Massachusetts
1900-1921



Cancer.

The cancer death rate still shows a steady increase, reaching a figure of 119.5 deaths per 100,000 population in 1921. The rate for 1922 is, of course, not yet available. Undoubtedly, part of this rise is due to a greater accuracy of reporting and more general use of the diagnostic facilities available to physicians and hospitals. Furthermore, there are more people now living to be of cancer age than formerly and in the New England states particularly there is a greater proportion of people of cancer age than in some of the states with a younger population. Making allowances for everything, however, it remains a fact that in cancer we have as yet an unsolved problem. The accompanying chart shows the cancer rate for Massachusetts for the last few years.



FUTURE AIMS.

It may not be amiss in closing to outline the aims which underlie the activities of the Division of Hygiene.

1. It plans to make careful, scientific studies, especially as to cause and prevention of maternal and infant mortality, and of the health conditions surrounding the child of older age.

2. It hopes to serve as the headquarters for the State for facts bearing upon the health of the child and the hygiene of the older individual—in other words, to serve as a general clearing house for this type of information.

3. It purposes to give the public the latest information in the clearest manner possible concerning matters of hygiene.

4. It is especially desirous of reaching the teachers of the community, whether professional or lay, to bring to them information which they may in turn get across to those with whom they come in contact.

5. It hopes to encourage private groups in the different municipalities and the official bodies belonging to the municipalities themselves to extend their activities for the protection of the health of children.

REPORT OF DIVISION OF TUBERCULOSIS (SANATORIA).

The work of the Division of Tuberculosis has not been extended into new fields but rather in developing the various functions that have seemed, by experience, to offer the greatest amount of service. Increased effort has been made to develop the clinical facilities of the State, especially the examination of underweight school children. As a result of this campaign 25,119 individuals have been examined by the various dispensaries and State clinics in 1922.

SANATORIA.

The four sanatoria under this Division, — Rutland, Westfield, North Reading and Lakeville, have provided a total of 385,707 days of treatment for 2,378 patients, an increase of 10,172 days over last year, with only an increase of 15 patients cared for. The average length of residence was 310 days.

This extended period of sanatorium treatment has never been equalled before and is very encouraging to those connected with the work. Last March, for the first time in several years, all the State Sanatoria were filled to capacity. At present there are only a few vacancies at Lakeville and an ever increasing number of applicants are being placed upon the waiting list.

During the past year all adult patients at Westfield have been either discharged or transferred to some other institution, as the case indicated, and now it may be truly called a children's sanatorium. The policy of admitting only children at Westfield has received the approval and support of all official and non-official agencies throughout the state, demonstrating that physicians, health agencies, and the public, have awakened to the importance of childhood tuberculosis and the value of institutional care for this type of the disease.

In studying the reports of the sanatoria it is noticeable that an increasing number of advanced and unfavorable cases are being admitted. There are two reasons for this: 1st, the method of admission; 2nd, lack of hospital facilities in Middlesex and Worcester Counties. Many patients admitted to the sanatoria upon application blanks stating that they are in the early stages of the disease are found upon examination at the sanatorium to be moderately advanced or far advanced. The truth of this statement is strikingly demonstrated in a table in the superintendents' reports showing the condition of patients as stated on the application blanks and the condition actually found on admission. Accepting the statement of the physician on the application blank as made in good faith, it is evident that the general practitioner cannot accurately diagnose and classify pulmonary tuberculosis. Apparently there is great need of acquainting the family physician as to what constitutes a beginning tuberculosis of the lungs.

At the present time all patients in Middlesex and Worcester Counties, with the exception of the cities of Cambridge, Lowell and Worcester, have to be admitted to the State Sanatoria and must continue to be until these counties in some way provide for their advanced cases.

INSTITUTION STUDIES.

In cooperation with the office of the Supervisor of Administration an attempt has been made to properly classify and standardize positions, salaries, ratio of employees to patients, etc. This study has definitely shown that owing to the different type of construction, location, different class of patients cared for, use of

ex-patients as employees in some institutions against a majority of able-bodied employees in others, no uniform policy can be established. These studies, however, have been of great value and already a definite policy has been established; but for reasons given above we can never be expected to standardize the personnel of the State Sanatoria as it has been possible in some other types of State institutions.

In cooperation with the Department of Agriculture important studies have been made on farm problems at all the sanatoria. These include studies on swine raising, feeding and disease prevention; poultry problems; economic production and utilization of farm and garden produce; better methods of increasing dairy production, and, the biggest problem of all, eradication of tuberculosis in our dairy herds. I wish to express my thanks to the office of the Supervisor of Administration and to the Department of Agriculture for their excellent advice and cooperation, and feel that the results of these studies will be of great value to the individual institutions and to the Commonwealth.

TUBERCULOSIS DISPENSARIES.

For the first time in several years we have accurate information as to the amount of work carried on by the 56 dispensaries throughout the state. Early last year a monthly report blank was issued to each dispensary with the request that they be filled out and returned to this Division on or before the 10th of each month. Nearly all the dispensaries willingly cooperated and regularly reported, as requested. In compiling this information for all the various dispensaries we find that 21,692 people were examined last year. 1,614 were diagnosed as tuberculous; 1,742 suspicious; 4,790 non-tuberculous; other forms 250. A large per cent of the remaining number were ex-patients returning to the dispensaries for follow-up treatment and supervision. This, I feel, is a gratifying report and proves that this is the most important agency we have in the state for discovering tuberculosis and supervising those who suffer from it. Although this report is very encouraging I feel that next year 30,000 cases ought to be examined.

CONSULTATION CLINICS.

The sixteen consultation clinics established in the state are becoming better known and are being utilized to a greater extent by the physicians. More communities have requested this service. Malden and Newburyport have recently been provided with clinics and a clinic for Greenfield is being arranged. Hundreds of notices have been sent out from this office notifying physicians of this service, during the past year.

Recently arrangements have been made with some local tuberculosis association in the city or county where the clinics are held to send out the notices to the physicians regarding the time and the place of the clinic. This is proving a very satisfactory method of publicity and tends to make the work of local interest and pride.

It is interesting to note that an increasing number of ex-sanatoria patients have returned to the sanatoria for examination and advice, also that many physicians living in towns accessible to the institutions are referring their suspicious cases directly to the sanatorium for examination by experts. These two important functions of the institution have not been realized enough in the past and every effort will be made in the future to further develop this service. The sanatoria, both state and county, as we have hoped, are gradually becoming the centers of tuberculosis work and education. Through the 16 consultation clinics and examinations made at the sanatoria 1,366 patients have been examined in 1922 against 895 last year.

EXAMINATION CLINICS.

66 examination clinics held in 49 towns is the record for 1922. 2,061 underweight school children have been examined. 8% of this number were diagnosed as tuberculous, and about 2% were found to be in need of immediate sanatorium

treatment. Last year these clinics were confined to the western part of the state and were held in 12 towns. 225 children were examined. Through the cooperation of the Massachusetts Tuberculosis League and its enthusiastic workers, these clinics have been carried into all parts of the state with results which speak for themselves.

I am informed that sixty towns have already requested this service for 1923, and the amount of work we can do is only limited by the size of the sanatoria staffs. I believe these clinics have greater possibilities for the ultimate control of tuberculosis than any other one method adopted by the State.

FIELD AND FOLLOW-UP WORK.

The special tuberculosis investigation authorized by the Legislature in 1922 required so much work that it has been impossible for me to give the field and follow-up work the necessary time which ought to be devoted to it. However, through the splendid service and cooperation of the District Health Officers and their nursing assistants, the work has not materially changed from last year.

There are on file in the Division initial histories and follow-up information on over 25,000 reported cases. I feel that more effort ought to be made to keep this information accurate and up to date. We little realize the amount of time required in the office and by the nursing assistants in the field to obtain this valuable information.

CONFERENCES.

Two meetings of the District Medical Society have been held at Lakeville, and local Society meetings or small groups of physicians have held meetings at the other sanatoria. Two large and enthusiastic Public Health Nurses conferences have been held at Westfield and Rutland. Arrangements will be made in the spring for holding similar meetings at North Reading and Lakeville. These conferences not only give the physicians and nurses an opportunity to see the sanatorium and the work it is doing but are an important step in our program to make the institutions the centers of education.

SUBSIDY.

The law provides that under certain conditions cities and towns providing hospital care for cases of pulmonary tuberculosis in approved hospitals are reimbursed by the Commonwealth at the rate of \$5.00 per week for each patient. For the year ending Nov. 30, 1922 this Division has received 2,217 claims for subsidy from 92 cities and towns. Of this number 1,677 claims, amounting to \$178,797.93 were allowed.

From reports already available it looks as though the low death rate of 84.9 per 100,000 for pulmonary tuberculosis in 1921 will at least be equalled and possibly lowered in 1922. Massachusetts, with 3,800 beds available for treatment and only an average of 3,300 deaths per year, has, by all standards, provided adequate care for all requesting or needing hospital and sanatorium treatment. The hope for further decreasing the mortality rate must come from the further development of the dispensaries, special clinics and follow-up work. Most important of all is a campaign of education along special health and preventive lines and special education for both the physician and the public, as to what constitutes early pulmonary tuberculosis.

LAKEVILLE STATE SANATORIUM.

RESIDENT OFFICERS.

SUMNER COOLIDGE, M.D.	.	.	.	.	.	.	Superintendent.
MINOT W. GALE, M.D.	.	.	.	.	.	.	Ass't Superintendent.
HARRY SILBERT, M.D.	.	.	.	.	.	.	Ass't Physician.
Mrs. MARY M. COAKLEY	.	.	.	.	.	.	Steward.
Mrs. HARRIET M. GASSETT	.	.	.	.	.	.	Head Matron.
ROBERT A. KENNEDY	.	.	.	.	.	.	Chief Engineer.
THOMAS FRANCIS MAHONEY	.	.	.	.	.	.	Head Farmer.

REPORT OF THE SUPERINTENDENT.

To EUGENE R. KELLEY, M.D., *Commissioner, Department of Public Health, State House, Boston, Mass.*

I have the honor to submit the thirteenth annual report of the Lakeville State Sanatorium for the year ending November 30, 1922:

During the year there has been expended \$191,341.95 for maintenance, a gross weekly per capita cost of \$15.1338, and \$27,206.96 from the appropriation authorized by Chapters 129 and 203, Resolves of 1921 and 1922.

There has been collected from miscellaneous sources \$32,167.24 (the total of all collections). Deducting this amount from the gross maintenance expense leaves a net expense of \$159,174.71, and a net weekly per capita cost of \$12.5896.

There has been collected from private funds \$4,191.18; from cities and towns \$27,029.35.

75 cases were supported wholly or in part from private funds; 308 by cities and towns; 101 wholly by the state; 2 by the United States Veterans' Bureau.

There were 244 patients in the sanatorium at the beginning of the year, and 209 at the close. The largest number present at one time was 270, and the smallest was 209. The daily average number of patients was 243.1397. There were 394 cases admitted during the year; 29 minimal; 187 moderately advanced; 158 advanced, and 18 not classified, and 2 not examined. There were 289 cases admitted from cities and towns of over 25,000 population, and 105 from cities and towns under 25,000 population. The average age of patients admitted was 33. Including deaths there were 423 discharged, and the average duration of residence was 7 months and .18 days. Of those discharged 223 gained 2,959½ pounds, an average gain of 13¼ pounds per person. Of the discharges there were 2 apparently arrested cases, 6 less than last year; 18 quiescent, the same as last year; 185 improved, and 81 unimproved. There were 53 patients not considered, the duration of treatment being less than one month. There were 83 deaths, 2 less than last year. There was 1 discharged non-tuberculous. There were 88,746 hospital days of treatment, 2,272 more than last year.

The following table shows the classification on the application blank and our classification on admission:—

	Classification on Appli- cation Blanks.	Our Classifica- tion on Admission.
Minimal	54	30
Mod. Adv.	242	185
Advanced	74	157
Unclassified	24	20
Not examined	—	2
Totals	394	394

MEDICAL REPORT.

The vacancy in the medical staff caused by the resignation of Dr. Earl F. Ryan on Oct. 3, 1921, was not filled until Feb. 19, 1922, when Dr. Edmund Wallner of Budapest, Hungary, was appointed for temporary service. On Oct. 3, 1922, Dr. Harry Silbert, Tufts Medical School, 1921, was given a permanent appointment to the position, since which time the medical work has gradually resumed its normal course. Because of the unsettled conditions in the medical staff only the routine work, clinical examinations of patients and clinical laboratory work, has been kept up to date.

A request is made this year for the employment of a dentist who shall work at the sanatorium two days each week.

CLINICS.

The sanatorium staff has continued its attendance at Consultation clinics in Fall River, Brockton, Taunton and Plymouth with the following results:—

Fall River	1
Brockton	18
Taunton	18
Plymouth	23
	60

The larger number of patients examined shows an increasing cooperation of the practicing physicians in the cities above mentioned.

Children's clinics for the examination of underweight school children have been held in Assonet, Swansea, Freetown, Myricks, Somerset, Berkley, Rehoboth, Wrentham, Medway and Foxborough, where 425 children have been examined. Approximately 10% of all the children examined have been found definitely tuberculous or suspicious.

Twelve patients were referred by outside physicians to the sanatorium for diagnosis. Of these four were found to be tuberculous.

FARM.

Although farm crops were not uniformly successful during the past year, the gross result made a very satisfactory showing, both in quality and quantity of food stuffs produced. The principal items were —

Milk	190,420 quarts
Eggs	10,556 dozens
Poultry	10,602 pounds
Pork	31,907 pounds

besides small fruits and vegetables sufficient for the annual consumption of the institution, including canned goods.

The tuberculosis-free herd of dairy cattle has progressed satisfactorily, numbering now fifty animals, of which twelve are now milking.

IMPROVEMENTS.

An addition to the chapel has just been completed, affording an ample stage with well appointed dressing rooms, and increased seating capacity of the chapel, so that sanatorium audiences are now comfortably seated within the chapel walls. Incidental to this chapel improvement is the provision for a well lighted and equipped clinical laboratory, and the installation of a complete X-Ray equipment. The institution is thus brought up to date in its laboratory facilities, and thus equipped should be capable of doing more scientific medical work.

During the year the steam connections of the two original steam boilers installed in the power plant have been thoroughly renovated with new fittings, and larger steam connections installed.

The rendering house which also houses the canning equipment has been rebuilt, and at the administration building a comfortable screened porch has been provided for employees who live there.

RECOMMENDATIONS.

Having been intimately connected with the original construction of this institution on a plan which seemed at the time parsimonious and ill advised, I have hoped that by adding judiciously from time to time to the efficiency of the institution and to the comfort of its inmates, there might be developed here a sanatorium unit economical in administration, well rounded in all practical ways, with as high a degree of permanency as possible under the conditions in which the original construction was completed. There are still glaring deficiencies which relate to the safety of the lives and to the comfort of inmates and employees, and to the economical and efficient administration of sanatorium affairs as a whole.

At the present time the water supply is entirely inadequate, both in quantity supplied and in storage facilities. A fire once started in this institution under certain conditions would sweep all before it in spite of all human effort could do to prevent. I renew my request for an extension of the water supply, as well as of the pumping equipment and storage capacity which will involve the addition of equipment for fire protection. For the erection of a 30,000 gallon tank and the installation of a new pump I recommend the appropriation of \$9,849.80. To this should be added sufficient to cover work now being planned by the division of sanitary engineering for increasing the source of supply.

The next crying need of the institution is an improvement in the housing conditions for employees which will result in greater comfort for the very sick patients. Up to the present time it has been necessary to house male employees on the second floors of the ward buildings in rooms that are directly over the very sickest patients we have. This arrangement, bad as it is, was necessary at the time the institution was built in order that the building might be accomplished with the appropriation allowed. I now request a dormitory for male employees and a few married quarters which will contain

thirty-five beds, entirely apart from all buildings occupied by patients, this building estimated to cost \$42,453. When this building is completed it is proposed to remodel the upper floors in the ward buildings for commodious quarters for female nurses who are now housed in the upper story of the administration building, and this accomplished, to remodel the upper story of the administration building to make commodious married quarters for the medical staff, and rooms also for the office employees.

One other feature of the housing problem seems to me very important, namely the provision of homes for permanent employees with families. Several such homes are in the market now, or soon will be, and I recommend the purchase of these because new homes cannot be constructed for the same money, and incidentally some very close neighbors who may become a constant annoyance to the institution can be removed. I recommend the purchase at once of the small property of Clarence A. Holmes on Bridge Street, for \$3,500, and the purchase of the Spooner property containing twelve acres of land and two houses adjoining the sanatorium property on Main Street, for \$6,500. Experience has strengthened my conviction that in this vicinity it is to the financial advantage of the Commonwealth to house as many of its employees as possible. A day laborer who lives at home receives \$20 per week. A man who is maintained at the sanatorium receives \$40 per month, from which only one inference is possible.

ACKNOWLEDGMENTS.

It is pleasant to report another year of helpful cooperation on the part of Catholic, Protestant and Jewish clergymen who have served as chaplains during the year, and the faithful service of the medical staff, and heads of departments without which sanatorium administration would be indeed difficult.

I wish to express also the appreciation of patients of frequent donations of books, magazines, and entertainments.

Respectfully submitted,
SUMNER COOLIDGE,
Superintendent.

VALUATION.

	<i>Land.</i>	
Grounds (50 acres)		\$9,789 17
Lawns and buildings, 48 acres.		
Roads, 2 acres.		
Woodland (10 acres)		535 70
Mowing (47 acres)		2,250 37
Tillage (49 acres)		4,311 51
Tillage, 30 acres.		
Garden, 19 acres.		
Orchard (8 acres)		611 65
Pasture (13 acres)		696 41
Waste and miscellaneous (32 acres)		1,542 27
Rough pasture, 20 acres.		
Meadow swamp land, 11 acres.		
Sewer beds.		
New Coal trestle, 1 acre.		
		<hr/>
		\$19,737 08
Sewerage system		4,572 00
		<hr/>
Total		\$24,309 08
	<i>Buildings.</i>	
Institution buildings		\$140,089 03
Farm, stable and grounds		34,142 87
Miscellaneous		91,410 10
		<hr/>
		265,642 00
		<hr/>
		\$289,951 08
Present value of all personal property as per inventory of Dec. 1, 1922		113,599 45
		<hr/>
Grand total		\$403,550 53

STATISTICAL TABLES.

TABLE I. — *Admissions and Discharges.*

	Males.	Females.	Totals.
Number of patients admitted Dec. 1, 1921, to Nov. 30, 1922, inclusive	262	132	394
Number of patients discharged Dec. 1, 1921, to Nov. 30, 1922, inclusive	286	137	423
Number of deaths (included in preceding item)	60	23	83
Number remaining in sanatorium Nov. 30, 1922	135	74	209
Daily average number of bed patients Dec. 1, 1921, to Nov. 30, 1922	60	44	104
Daily average number of patients	161	82	243

TABLE 2. — *Civil Condition of Patients admitted.*

	Males.	Females.	Totals.
Married	136	65	201
Single	109	59	168
Widowed	13	8	21
Divorced	4	—	4
Totals	262	132	394

TABLE 3. — *Ages of Patients admitted.*

	Males.	Females.	Totals.
14 to 20 years	28	15	43
20 to 30 years	69	69	138
30 to 40 years	87	25	112
40 to 50 years	65	15	80
Over 50 years	13	7	20
Unknown	—	1	1
Totals	262	132	394

Average age, 33 years.

TABLE 4. — *Nativity and Parentage of Patients admitted.*

PLACES OF NATIVITY.	MALES.			FEMALES.			TOTALS.		
	Patients.	Fathers.	Mothers.	Patients.	Fathers.	Mothers.	Patients.	Fathers.	Mothers.
United States:									
Massachusetts	93	24	26	61	20	20	154	44	46
Other N. E. States	16	8	12	7	6	7	23	14	19
Other States	9	13	10	6	5	8	15	18	18
Other Countries	118	45	48	74	31	35	192	76	83
Unknown	142	212	205	61	106	102	200	309	300
	2	5	9	4	2	2	2	9	11
Grand totals	262	262	262	139	139	139	394	394	394

Patients native born, 48.7310 per cent; patients foreign born, 51.2690 per cent.

TABLE 5. — *Occupation.*

	Males.	Females.	Totals.
Assembler, watch factory	1	—	1
At home	—	6	6
Baker	3	—	3
Bank Clerk	1	—	1
Barber	1	—	1
Bootblack	1	—	1
Brakeman	1	—	1
Buckle Shop	—	1	1
Bookkeeper	—	4	4
Blacksmith	2	—	2
Cabinet Maker	1	—	1
Carriage Factory	1	—	1
Cableman	1	—	1
Cigar Maker	1	—	1
Cashier	—	2	2
Construction worker	4	—	4
Clerks	13	7	20
Confectionery factory	1	—	1
Conductor	5	—	5
Chocolate dipper	—	1	1
Cotton mill	10	8	18
Creamery hand	1	—	1
Caulker	1	—	1
Chauffeur	3	—	3
Chair Factory	1	—	1
Chef	1	—	1
Carpenter	8	—	8
Cook	2	1	3
Dairy hand	1	—	1
Dye house	1	—	1
Dishwasher	1	—	1
Dressmaker	—	4	4
Drug clerk	1	—	1
Editor	1	—	1
Engineers	2	—	2
Electrician	1	—	1
Elevator Operator	1	—	1
Electric shop	—	1	1
Farmers	4	—	4
Fisherman	1	—	1
Furniture mover	1	—	1
Freight inspector	1	—	1
Foundry	1	—	1
Garment Factory	1	—	1
Gardener	1	—	1
Grinderman	1	—	1
Governess	—	1	1
Guilder's Helper	—	1	1
Greenhouse	1	—	1
Grocer	1	—	1
Hatter	—	1	1
Hod Carrier	1	—	1
Hospital Attendant	2	2	4
Housekeeper	—	17	17
Housewife	—	52	52
Heel Factory	1	—	1
Interpreter	—	1	1
Ironworker	1	—	1
Iron moulder	1	—	1
Janitor	2	—	2
Jewelry shop	1	—	1
Jeweller	1	—	1
Laborer	10	—	10
Laundress	—	1	1
Loom operator	1	—	1
Leather factory	1	—	1
Linen Mill	2	—	2
Longshoreman	2	—	2
Machinist	15	—	15
Meat Business	1	—	1
Meat Cutter	4	—	4
Maid	—	1	1
Mill hand	1	—	1
Mop factory	1	—	1
Musician	2	—	2
Mason	2	—	2
Mechanic	2	—	2

TABLE No. 5. — *Occupation* — Concluded.

	Males.	Females.	Totals.
Merchant	5	—	5
Mule Spinner	1	—	1
Milk Tester	1	—	1
Miner	1	—	1
Manager, Grocery store	1	—	1
Nurse	—	1	1
None	2	—	2
Peddler	2	—	2
Plasterer	1	—	1
Paper mill	2	—	2
Paper hanger	1	—	1
Printer's draftsman	1	—	1
Painter	1	—	1
Photographer	1	—	1
Printer	3	1	4
Policeman	1	—	1
Riveter	1	—	1
Restaurant	1	—	1
Rubber Factory	4	—	4
Ring Polisher	1	—	1
Roofer	1	—	1
Saleslady	—	4	4
Salesman	2	—	2
Seaman	1	—	1
Second hand, in mill	16	1	17
Shoe factory	1	—	1
Special Police	—	1	1
Steel worker	—	2	2
Stitcher	1	—	1
Solecutter	2	—	2
Steamfitter	1	—	1
Shipyard	3	1	4
Student	1	—	1
Steward (hotel)	5	—	5
Stonecutter	—	1	1
School teacher	—	1	1
Tack factory	—	1	1
Tailor	8	—	8
Teamster	5	—	6
Truckman	4	—	4
Telegraph clerk	2	—	2
Telephone operator	—	1	1
Teacher, languages	—	1	1
Tinsmith	1	—	1
Toolmaker	1	—	1
Upholsterer	6	2	8
Weaver, cotton mill	5	—	5
Woolen mill	5	—	5
Waiter	—	1	1
Waitress	1	—	1
Watchman	2	—	2
Watchmaker	—	1	1
Wire factory	262	132	394

TABLE 6. — *Condition on Admission.*

	Males.	Females.	Totals.	Percentage.
Minimal	7	22	29	7.36
Moderately advanced	131	56	187	47.46
Advanced	109	49	158	40.10
Not classified	13	5	18	4.56
Not T. B.	—	—	—	—
Not examined	2	—	2	.50
Totals	262	132	394	—

TABLE 7. — *Condition on Discharge.*

	Males.	Females.	Totals.	Percentage.
Apparently Arrested	—	2	2	.47
Quiescent	11	7	18	4.25
Improved	137	48	185	43.73
Unimproved	45	36	81	19.14
Died	60	23	83	19.62
Not considered	33	20	53	12.52
Non T. B.	—	1	1	.23
Totals	286	137	423	—

TABLE 8. — *Deaths.*

DURATION OF DISEASE.	Males.	Females.	Totals.	LENGTH OF RESIDENCE AT SANATORIUM.		
				Males.	Females.	Totals.
Under 1 month	—	—	—	9	3	12
1 to 2 months	—	—	—	5	—	5
2 to 3 months	1	—	1	7	3	10
3 to 4 months	—	—	—	7	8	15
4 to 5 months	—	—	—	5	1	6
5 to 6 months	1	1	2	2	2	4
6 to 7 months	2	—	2	1	2	3
7 to 8 months	3	—	3	—	—	—
8 to 9 months	4	4	7	2	—	2
9 to 10 months	2	1	3	3	—	3
10 to 11 months	2	1	3	—	—	—
11 to 12 months	5	1	6	1	1	2
12 to 18 months	6	2	8	7	—	7
18 to 24 months	4	1	5	5	1	6
Over 2 years	30	12	42	6	2	8
Unknown	1	—	1	—	—	—
Totals	60	23	83	60	23	83

TABLE 9. — *Cause of Death.*

	Males.	Females.	Totals.
Phthisis Pulmonalis	60	23	83
Totals	60	23	83

RUTLAND STATE SANATORIUM.

RESIDENT OFFICERS.

ERNEST B. EMERSON, M.D.	Superintendent.
LEON A. ALLEY, M.D.	Asst. Superintendent.
HALBERT C. HUBBARD, M.D.	Physician.
WILLIAM B. DAVIDSON, M.D.	Physician.
JAMES F. McLAUGHLIN, M.D.	Physician.
MARK H. JORESS, M.D.	Physician.
WILLIAM J. O'CONNOR, D.M.D.	Dentist.
DELYA E. NARDI	Superintendent of Nurses.
CORA A. PHILLIPS	Head Matron.
OLIN C. BLAISDELL	Steward.
WALTER C. BROWN	Chief Engineer.
JOSEPH A. CARROLL	Farmer.

REPORT OF THE SUPERINTENDENT.

To EUGENE R. KELLEY, M.D., *Commissioner, Department of Public Health, State House, Boston, Mass.*

I have the honor to submit the twenty-sixth annual report of the Rutland State Sanatorium for the year ending November 30, 1922.

During the year there has been expended \$280,912.74 for maintenance, a gross weekly per capita cost of \$15.2066. There has been expended from the special appropriation authorized by Chapter 129, Resolves of 1922, \$36,853.45.

There has been collected from miscellaneous sources (the total of all collections) \$96,687.45, an increase of 64 per cent over the collections of last year. Deducting this amount from the gross maintenance expense leaves a net expense of \$184,225.29, a net weekly per capita cost of \$9.9727, 29 per cent less than last year. There has been collected from private sources \$13,366.50, 5 per cent increase over last year and the largest collection since 1913; from cities and towns \$45,578.54, an increase of 14 per cent over last year; from the United States Veterans' Bureau \$35,305.67. One hundred and fifteen cases were supported wholly or in part from private funds; two hundred and seventy-nine by cities and towns; sixty-one wholly by the State; eighteen by the United States Veterans' Bureau.

There were 362 patients in the Sanatorium at the beginning of the year, 347 at the close. The largest number present at one time was 372 and the smallest 328. The daily average number of patients was 355.25. There were 448 cases admitted during the year: 68 incipient, 136 moderately advanced, 220 far advanced and 24 unclassified. There were 303 cases admitted from cities and towns of over 25,000 population, and 145 from cities and towns under 25,000 population. The average age of patients admitted was 28 years. Including deaths, there were 465 patients discharged, and the average duration of residence was 301 $\frac{2}{3}$ days. Of those discharged 319 gained 4,243 pounds, an average gain of 13.30 pounds per person. Of the discharges there were 13 arrested cases, one less than last year; 19 apparently arrested, 7 less than last year, 213 quiescent, 2 less than last year, 61 improved, 58 unimproved, 1 no diagnosis made and 33 not considered, the duration of treatment being less than one month. There were 58 deaths, 7 more than last year. There were 9 discharged non-tuberculous. There were 129,668 hospital days of treatment, 3,261 more than last year.

The following table shows the classification on the application blank and our classification on admission:—

	Classification on Appli- cation Blank.	Our Classifica- tion on Admission.	Per Cent.
Incipient	252	68	15.2
Moderately advanced	169	136	30.4
Far advanced	13	220	49.1
Unclassified	14	24	5.3
Totals	448	448	—

The 1921 admissions were classified as follows:—

Incipient	118, or 24.4 per cent.
Moderately advanced	174, or 36.0 per cent.
Far advanced	165, or 34.0 per cent.
Unclassified	26, or 5.6 per cent.

It will be noted from the foregoing that there has been a striking reduction in the number of early and favorable cases for arrest or cure.

There were 20 deaths or 34 per cent recorded within 6 months of the date of admission and 35 deaths or 60 per cent within 1 year of admission. These cases were properly classified in the local hospital and many of them should not have been subjected to the hardships of travel to Rutland.

They indicate clearly the tendency of Rutland to function as a hospital for incurables rather than as a sanatorium for hopeful cases.

We have continued the policy of bed treatment for a large group of patients previously treated as semi-ambulatory or chair cases. Lunches have been prescribed in only a few

individual cases. Last year of those who gained we noted an average increase of 2 pounds more than in previous years. This increase has been maintained, in spite of the fact, that during the year we have admitted more advanced cases. The increase is attributed to rational feeding and treating this group as semi-bed rather than as chair cases.

The following routine examinations are made on all new admissions: Sputum, urine, blood, dental and X-Ray.

Urine examinations:

Routine	637
Special (24-hour specimens)	144

Total 781

Sputum examinations for tuberculosis:

Positive	3,054
Negative	3,108

6,162

Sputum examinations for tuberculosis, private sanatoria:

Positive	96
Negative	59

155

Total 6,317

Sputum examinations (special):

For pneumococcus	2
For B. influenza	1
Antiformin method on 24-hour specimens for tuberculosis	33

Blood drawn for Wassermann test:

Positive	27
Negative	411
Doubtful	13

Total 451

Blood counts 25

Blood smears for malarial parasites 1

Blood culture 1

Occult blood examinations 3

Cultures from wounds, etc. 4

Cultures (special) from urine and feces for B. Typhosus 1

Fluids (abdominal and pleural), chem. and bact. examinations 10

Guinea pig inoculations and autopsies 22

Smears, from eyes, throat, etc., for differentiation of organisms 8

Preparation of milk with B. acidophilus cultures (quarts) 43

Experiment to determine the phenol coefficient of Wescol as disinfectant.

Classes in urine analysis and bacteriology conducted for nurses in training school.

Of 347 patients remaining in the sanatorium on November thirtieth, 253 or 72.91 per cent are positive cases; the tubercle bacillus has not been found in 88 or 25.36 per cent; and 6 cases have reported no sputum.

The work of the X-Ray laboratory has been confined principally to chest examinations, but numerous gastrointestinal, bone and joint pictures have also been taken. There were 1,388 X-Ray plates made.

The following table is a summary of the dental work done during the year:—

Prophylactics	278
Amalgam fillings	72
Cement fillings	156
Gutta-percha fillings	216
Temporary fillings	163
Pulp treatments	31
Treatment cases	563
Surgical dressings	16
Extractions	268
Abscess cases	86
Mouth washes	40
Vincent's Disease	5
Inlays	76
Repairs to plates	21
Bridges	76
Plates	12
Crowns	110
X-Rays	154
Repairs to bridges	9
Bed treatments	28

The Staff meets Monday mornings for the consideration of administrative questions, the presentation of papers or a review of current medical literature. A clinical conference is held on Tuesday and Friday mornings for examination and classification by the Staff of all admissions.

The Public Health Nurses of Worcester County and the Wachusett Medical Society have held meetings at the sanatorium and clinics for students and physicians have been given by the Staff.

The consultation clinics have been held monthly in Worcester, Fitchburg, Clinton and Gardner and I believe a sufficient number of patients has been reached to justify the time and effort involved in community service. In the majority of cases there is probably a small margin of error in the diagnosis at these clinics. There remains, however, a fairly large group in which it is impossible to make a positive diagnosis on a single examination and in some instances after several examinations. In many cases little or no history is obtainable particularly a history of the temperature and increase in pulse rate, both of which are of the greatest importance. It will be noted in the following table that 66 of the patients were marked for observation and of that number only 11 reported for a second examination. Not infrequently there are cases of tuberculosis in which a diagnosis can be made only after a most careful study and investigation, involving the X-Ray, laboratory and clinical observation. As mentioned in the report of last year, a large proportion of these obscure cases might be satisfactorily cleared up were it possible to admit them to a sanatorium for a limited period of observation and study. As our admitting wards are essentially observation wards for the cases regularly admitted but not necessarily correctly diagnosed it would appear to be a logical step to admit at once for observation the doubtful cases discovered at the clinic and if the patient is found to be non-tuberculous, he need not be labeled as such; no harm has been done and he may be relieved of the depressing thought that he is a consumptive. On the other hand, time may be saved in starting the proper treatment which in early and acute cases is of vital importance.

The following statistics are for the twelve months ending Nov. 30, 1922:—

Number of patients examined	210
Diagnosis:	
Tuberculosis	95
Non-tuberculous	49
Observation	66
Total	210
Number of physicians referring cases	85
Number of patients examined once	198
Number of patients examined twice	11
Number of ex-patients examined once	12
Number of ex-patients examined twice	3
Number of ex-patients examined three times	1
Number of ex-patients examined five times	1
Number of ex-patients examined eight times	1

There were 19 cases admitted to this sanatorium following examinations at the clinics. The following examinations were made at the sanatorium:—

Ex-patients examined	125
Patients referred by outside physicians	54
Patients examined at own request	61
Total	240
Diagnosis:	
Tuberculosis	197
Non-tuberculous	24
Observation	16
No diagnosis made	3
Total	240
Number of physicians referring cases	49
Number of ex-patients examined once	123
Number of ex-patients examined twice	22
Number of ex-patients examined three times	8

There were 26 cases admitted following examinations at the sanatorium.

There has been a slight falling off this year in the number of patients examined at the consultation clinics but on the other hand there has been an increase in the number of examinations made at the sanatorium. The report of the consultation clinics of last year was for a period of fifteen months, whereas, the report for this year is for the twelve months ending November thirtieth. Last year there were 296 patients examined at the clinics and 119 examined at the sanatorium, a total of 415, while this year there were 210 cases examined at the clinics and 240 at the sanatorium, a total of 450 cases, which is an increase of 35 over last year.

There were 49 physicians referring cases to the sanatorium for examination this year as against 31 last year and 85 physicians referring cases to the consultation clinics as against 71 last year.

Examinations of underweight school children were made in Athol, Auburn, Barre, Gilbertville, North Brookfield, Orange and Warren. The suspected cases after a short period for observation of temperature and pulse were brought to the sanatorium, X-rayed and examined by the Staff before a final diagnosis was made.

Number of school children examined 109

Diagnosis:

Tuberculosis	12
Non-tuberculous	73
Observation	24
Total	109

I believe this work is of great value and of vital importance for future generations and that it should be systematically followed up. The amount of work, however, that we can do is limited in a large measure by the size of the Staff. If there is sufficient interest aroused in school and health authorities, the examinations of school children and the consultation clinics will warrant the addition of another physician to the Staff.

Further provision should be made for the infirmary type of patient. More single rooms are needed for the terminal cases and also for the more intensive treatment of the acute cases. The number of bed patients has doubled within the past four years. Women employees are now occupying rooms and dormitories adjoining the wards and sharing toilet facilities and locker rooms with the patients; conditions exactly the same as those on the male side about to be relieved by the opening of the new employees' building. Aside from the crowding of toilet facilities, the intimate mingling of patients and employees is subversive of the morale of both groups. The conditions mentioned may be corrected by the erection of a building similar in size and construction to the employees' building on the male side. Such a building would make available for the treatment of patients the quarters now occupied by women employees and furthermore provide space for recreation or reading rooms. At the present time, with the exception of toilet and locker rooms, there is no place provided with heat during the day. This is a hardship particularly during the winter months. Although heat is turned on in the wards for a short time in the evening, it is expensive and unsatisfactory. The ambulatory wards should be used for sleeping quarters only and day space provided elsewhere.

Suitable quarters should be provided for the Medical Staff. At the present time four married physicians are living in single rooms and sharing toilet facilities with other employees. Such accommodations do not make for continuity of service, contentment or family life. The young physician does not become a specialist at the end of a year; he has only started, nevertheless, he is not satisfied with the inducements offered, and at the time when his knowledge and experience are beginning to count he looks elsewhere for those things which make life worth living. If we are to progress, and we are going backward if we do not, provision must be made to correspond in some measure at least to the living conditions the average physician is entitled to and is able to provide for himself either in general practice or in other institutions.

The space now occupied by the Medical Staff is needed for the clerical force. I recommend that measures be considered to provide three and four room apartments for the members of the Medical Staff.

With the opening of the Government Hospital, and the possibility of one large producer going out of business, we should plan to produce a sufficient milk supply to make us independent of all outside sources. The farm is better adapted for dairying than any other branch of farming and I believe we can, and should, produce milk at a fair margin of profit, and certainly far below what it would cost to purchase of the milk contractors. If this policy is pursued, we shall need within the next two or three years an addition to the cow barn for the tying of sixty to eighty cattle.

A vegetable cellar is much needed for the storing of vegetables in larger quantities than we have been able to handle them since steam heat was put into the old farmhouse. There are 32 nurses in training; 9 Probationers, 12 Juniors and 11 Seniors. The following have been awarded diplomas:—

Anne Gertrude Clark	Evelyn Searles Grainger
Maude Ellen Sinclair	Josephine Helen Carney
Greta Mary Malone	Helen Block Russell
Electa Laurine Bollivar	Elsa Flora Helmboldt
Bessie Lillian Pettipas	Evelyn Janet Guion
Rose Elizabeth Gerber	Winifred Mary Maguire
Lois Eleanor Magee	Frances Maude Patten

The affiliation with the Milford General Hospital has been continued and during the year an affiliation has been secured with the Worcester City Hospital. The eradication of tuberculosis from the herd apparently has been accomplished, no reactor having been found during the year. While the herd is small, there is a nucleus of young stock which looks promising for the future. The past season has not favored farming operations principally on account of the excessive rainfall from May 1st to August 31st inclusive, during which time 24 inches of rain is recorded.

One hundred and ninety-seven thousand feet of timber was sawed from the chestnut and pine cut last year. The ice storm at the beginning of the year caused a great amount of damage to the woods surrounding the sanatorium, making it necessary to do much clearing of brush and fallen trees, primarily for fire protection, and incidentally to salvage the wood and timber broken down by the ice.

Dr. David Zacks resigned August 31, 1922, to accept a more attractive position in another institution. Dr. Mark H. Joress, a graduate of Tufts Medical School, of the Beth Israel Hospital, Boston, and of St. Mary's Hospital, Detroit, was appointed.

Although it does not take effect until the close of the year, I record with regret the resignation of the Protestant Chaplain, Rev. Stanley C. Sherman, who has labored with energy and devotion for the welfare of all. Under his direction a church was organized with a membership composed of patients and employees; an organization unique in a public institution so far as I am aware.

I am deeply grateful to my co-workers and associates for their loyal support which merits public approval.

No less is my appreciation of your confidence and counsel.

Respectfully,
ERNEST B. EMERSON,
Superintendent.

VALUATION.

<i>Land.</i>	
Grounds (47.947 acres)	\$17,237 70
Lawns and buildings, 37.947 acres.	
Roads, 10 acres.	
Woodland (77.71 acres)	2,683 65
Mowing (81.35 acres)	8,244 50
Tillage (43.45 acres)	4,729 25
Tillage, 29.16 acres.	
Garden, 14.29 acres.	
Orchard (1.64 acres)	328 00
Pasture (72.93 acres)	2,719 05
Waste and miscellaneous (39.70 acres)	1,499 80
Rough pasture, 15.00 acres.	
Meadow swamp land, 18.22 acres.	
Sewer beds, 5.98 acres.	
New coal trestle, .50 acres.	
	<hr/>
Sewerage system	\$37,441 95
	15,508 32
Total	<hr/>
	\$52,950 27
<i>Buildings.</i>	
Institution buildings	\$530,169 14
Farm, Stable and Grounds	26,275 00
Miscellaneous	30,295 75
	<hr/>
	586,739 89
Total	<hr/>
	\$639,690 16
Present value of all personal property as per inventory of Dec. 1, 1922	89,201 25
	<hr/>
Grand total	\$728,891 41

STATISTICAL TABLES.

TABLE 1. — *Admissions and Discharges.*

	Males.	Females.	Totals.
Patients in Sanatorium Nov. 30, 1921	180	184	364
Patients admitted Dec. 1, 1921, to Nov. 30, 1922	235	213	448
Patients discharged Dec. 1, 1921, to Nov. 30, 1922	237	228	465
Patients remaining in Sanatorium Nov. 30, 1922	178	169	347
Daily average number of patients	181.14	174.11	355.25
Deaths (included in number discharged)	38	20	58

TABLE 2. — *Civil Condition of Patients admitted.*

	Males.	Females.	Totals.
Single	122	127	249
Married	105	81	186
Widowed	6	3	9
Divorced	2	2	4
	235	213	448

TABLE 3. — *Age of Patients admitted.*

	Males.	Females.	Totals.	Percentage.
Under 14 years	—	—	—	—
14 to 20 years	48	47	95	21.20
20 to 30 years	96	114	210	46.88
30 to 40 years	60	32	92	20.54
40 to 50 years	27	17	44	9.82
Over 50 years	4	3	7	1.56
Totals	235	213	448	—
Average age	29.10	27.24	28.21	—

TABLE 4. — *Nativity and Parentage of Patients admitted.*

PLACES OF NATIVITY.	MALES.			FEMALES.			TOTALS.		
	Patients.	Fathers.	Mothers.	Patients.	Fathers.	Mothers.	Patients.	Fathers.	Mothers.
United States:									
Massachusetts	138	39	48	120	34	40	258	73	88
Other New England States	13	20	11	21	16	14	34	36	25
Other States	15	13	12	10	11	11	25	24	23
Total Native	166	72	71	151	61	65	317	133	136
Other countries (26)	69	160	159	62	148	146	131	308	305
Unknown	—	3	5	—	4	2	—	7	7
Grand Totals	235	235	235	213	213	213	448	448	448

TABLE 5. — *Occupation of Cases admitted.*

	Males.	Females.		Males.	Females.
Accountant	2	—	Missionary	—	1
Agent, Ass't. Purchasing	1	—	Model, Cloak	—	1
Agent, Insurance	1	—	Musician	2	—
Artist	—	1	No Occupation	—	9
Attendant	2	—	Nursemaid	—	1
Auditor	1	—	Nurse, Student	—	6
Baker	1	—	Nurse, Trained	—	7
Barber	1	—	Orderly	2	—
Bookkeeper	2	8	Operator, Electrical	1	—
Carpenter	4	—	Operator, Telephone	—	6
Chambermaid	—	1	Painter	3	—
Chauffeur	8	—	Paper maker	1	—
Clerk, Drug	1	—	Paper hanger	1	—
Clerk, Office	15	16	Peddler	1	—
Cutter, Shoe	2	—	Physician	1	—
Cutter, Stone	1	—	Plumber	1	—
Delegate	1	—	Police Officer	1	—
Draftsman	1	1	Printer	2	1
Dressmaker	—	4	Professor, Agriculture	1	—
Editor	2	—	Real Estate	1	—
Electrician's Helper	2	—	Red Cross Worker	—	1
Engineer, Civil	1	—	Repairman, Electrical	1	—
Engineer, Mechanical	3	—	Roofer	1	—
Engineer, Stationary	1	—	Salespeople	13	5
Engraver, Stone	1	—	Seaman	2	—
Factory	14	24	Sewer	—	1
Farmer	1	—	Shipper	4	—
Farm hand	1	—	Shoe worker	6	—
Fireman, Stationary	2	—	Sheet Metal Worker	1	—
Florist	2	—	Singer, Professional	1	—
Forelady	—	2	Stage Manager	1	—
Foreman	2	—	Steamfitter	4	—
Foreman's Ass't.	1	—	Steel Worker	3	—
Freight Sorter	1	—	Stenographer	—	9
Gardener	1	—	Storekeeper	1	—
General Work	7	2	Student	13	10
Housewife	—	66	Superintendent	3	—
Housework	—	11	Superintendent, floor	1	—
Inspector	2	—	Switchman, Electrical	1	—
Janitor	1	—	Tailor	4	1
Jeweler	1	—	Teacher	—	4
Laborer	14	—	Teamster	6	—
Leather Worker	4	—	Traffic Manager	1	—
Machinist	14	—	Trainman, Passenger	1	—
Machinist's Helper	3	—	Truckman	2	—
Manicurist	—	1	Typist	—	1
Manager, Store	2	—	Upholsterer	1	1
Mechanic	2	—	Waiters	2	2
Metal Worker	1	—	Watchman	2	—
Messenger Boy	1	—	Weaver	1	3
Mill Work	9	5	Wireworker	1	—
Millinery	—	1			

Total number of occupations, 103; total number of patients, 448.

TABLE 6. — *Stage of Disease at Admission.*

	Males.	Females.	Totals.	Percentage.
Incipient	33	35	68	15.18
Moderately Advanced	76	60	136	30.36
Far Advanced	117	103	220	49.10
Unclassified	9	15	24	5.36
Totals	235	213	448	—

TABLE 7. — *Condition on Discharge.*

	Males.	Females.	Totals.	Percentage.
Arrested	2	11	13	2.78
Apparently Arrested	9	10	19	4.09
Quiescent	114	99	213	45.81
Improved	28	33	61	13.12
Unimproved	27	31	58	12.47
Deaths	38	20	58	12.47
Non-tuberculous	3	6	9	1.94
No Diagnosis	1	—	1	.22
Not Considered	15	18	33	7.10
Totals	237	228	465	—

TABLE 8. — *Deaths.*

DURATION OF DISEASE.	Males.	Females.	Totals.	LENGTH OF RESIDENCE AT SANATORIUM.		
				Males.	Females.	Totals.
Under 1 month	—	—	—	1	2	3
1 to 2 months	—	—	—	2	1	3
2 to 3 months	—	—	—	3	—	3
3 to 4 months	—	—	—	—	—	—
4 to 5 months	—	—	—	4	3	7
5 to 6 months	3	—	3	2	2	4
6 to 7 months	—	1	1	1	1	2
7 to 8 months	—	—	—	2	—	2
8 to 9 months	3	—	3	—	1	1
9 to 10 months	1	—	1	2	—	2
10 to 12 months	2	1	3	5	3	8
12 to 18 months	5	6	11	9	5	14
18 to 24 months	6	3	9	4	1	5
Over 2 years	18	9	27	3	1	4
Totals	38	20	58	38	20	58

TABLE 9. — *Cause of Death.*

	Males.	Females.	Totals.
Pulmonary tuberculosis	37	20	57
Pericarditis	1	—	1
	38	20	58

WESTFIELD STATE SANATORIUM.

RESIDENT OFFICERS.

HENRY D. CHADWICK, M.D.	Superintendent.
ROY MORGAN, M.D.	Asst. Superintendent.
HEMAN B. CHASE, M.D.	Physician.
THOMAS W. LOFT, D.D.S.	Dentist.
EMILY B. MORGAN	Supt. of Nurses & Matron.
FLORENCE I. SMITH	Steward.
BENJAMIN J. SANDIFORD	Chief Engineer.
ROBERT J. GOLDBERG	Farmer.

REPORT OF THE SUPERINTENDENT.

To EUGENE R. KELLEY, M.D., *Commissioner, Department of Public Health, State House, Boston.*

I have the honor to submit the thirteenth annual report of the Westfield State Sanatorium for the year ending November 30, 1922.

During the year there has been expended \$179,620.56 for maintenance, a gross weekly per capita cost of \$13.026.

There has been collected from miscellaneous sources \$42,380.51. Deducting this amount from the gross maintenance expense leaves a net expense of \$137,240.05, and a net weekly per capita cost of \$9.953. There has been collected from private funds \$4,977.20; from cities and towns, \$34,891.59; from the United States Veterans' Bureau \$690.15. 40 cases were supported wholly or in part from private funds; 298 by cities and towns; 87 wholly by the State; 2 by the United States Veterans' Bureau; 24 by the Department of Public Welfare; 88 Status undetermined.

There were 272 patients in the sanatorium at the beginning of the year, 267 at the close. The largest number present at one time was 278, and the smallest 254. The daily average number of patients was 265.24. There were 267 cases admitted during the year; 178 minimal, 55 moderately advanced, 30 advanced and 0 unclassified, 2 were non-tuberculous, 1 had bone tuberculosis and 1 a pulmonary abscess. There were 164 cases admitted from cities and towns of over 25,000 population, and 103 from cities and towns under 25,000 population. The average age of patients admitted was 12.14 years. Including deaths, there were 272 discharges, and the average duration of residence was 9 months and 19 days. Of those discharged 222 gained 2,830 pounds, an average gain of 12.7 pounds per person. Of the discharges there were 168 apparently arrested, 8 more than last year; 19 quiescent, 2 less than last year; 29 improved and 25 unimproved. There were 9 patients not considered, the duration of treatment being less than one month. There were 22 deaths, 16 less than last year. There were 2 discharged as non-tuberculous. There were 96,816 hospital days of treatment, 829 more than last year.

The following table shows the classification on the application blank and our classification on admission:—

	Classification on Appli- cation Blank.	Our Classi- fication on Admission.
Minimal	163	178
Moderately Advanced	64	55
Advanced	15	30
Unclassified	21	—
Non-tuberculous	—	2
Bone Tuberculosis	2	1
Pulmonary Abscess	—	1
Tuberculous Adenitis	1	—
Chronic Bronchitis	1	—
	267	267

MEDICAL REPORT.

We have been admitting more and more children each year until they have now displaced nearly all of the adult patients. This summer the policy of making Westfield an institution devoted exclusively to the care of children was put into effect, — the admission of adults was stopped and many of the older patients were transferred to other institutions. Only a few adult patients remained on November 30th, and by January 1st, 1923, not more than five will be left out of a total population of 265.

This transformation has been brought about so gradually that it has not met with any opposition. On the contrary the plan has had the hearty approval of all that have been familiar with the work done with the children at this institution. Not only is this an important event to record in the history of the Westfield State Sanatorium, but it marks a milestone in the tuberculosis movement in the state. When this sanatorium was opened in 1910 children had no place in the anti-tuberculosis program. It was not thought necessary at that time to make provision for them in any sanatorium. The crusade was waged against tuberculosis in adults and in the effort to find the early cases

our technic in physical examinations was improved and aided by the X-ray and tuberculin tests, and it was found that many children did have tuberculosis. Furthermore, it was soon seen that when they were given sanatorium care they responded to treatment more quickly than most of the adults. This was true of all cases where the pulmonary tissue was not extensively involved.

Our patients now being practically all children has made necessary some additions to our staff of employees. A physical director was employed for the summer months and his work proved to be of so much value that he has been continued in a permanent position. Two more attendants were needed in the wards to provide proper supervision and also to do some work that had previously been done by adult patients. More employees, therefore, are needed in this sanatorium to care for the children than was the case when we had adult patients. Not so many trained nurses will be required, however, as some of them can be replaced by attendants if women of the right type are available.

The food cost per capita for children may be a little less because simpler articles of food are served, but the quantity per patient is in excess of that required by adults, so there is not so much difference in cost as might be expected. Furthermore, this slight saving is more than offset by the additional expense of supervision and the educational facilities provided for out of our appropriation. The estimate for personal services in our educational department for the next year is \$5,900; the maintenance of these teachers would be at least \$1,680; the school books and manual training supplies \$550 more; then there is the cost of heating, lighting and repairs of the school building to be considered. This amount would approximate \$9,000, which is equivalent to a weekly per capita cost of 64 cents; therefore, any saving in the item of food cost is more than offset by the cost of the educational features provided.

I have written two papers in the last year, — "Tuberculosis in Children from the Standpoint of the Internist," which was published in the "Boston Medical and Surgical Journal" of September 28th, 1922, and "Tuberculous Children and What Can Be Done for Them," which was published in "The Commonwealth," Vol. 9, No. 4. I served as chairman of the committee appointed by the American Sanatorium Association to consider the classification of Juvenile Tuberculosis. This committee will make its report at the December meeting of the Sanatorium Association.

CLINICS.

The staff of the Westfield State Sanatorium have held many clinics in the four western counties of the state during the year. The territory we have covered is about one-third of the area of the state. It has necessitated about 5,000 miles of travel by train or automobile.

Consultation clinics have been held monthly in Adams, Pittsfield, Springfield and Holyoke. As this work is getting better known the physicians are showing their interest and appreciation by sending in more patients for examination. The total number examined at these clinics this year was 169:—

[illegible]

169

Examination Clinics have been held in 30 cities and towns. 1,312 patients have been examined. These have been extended to Franklin County and we have co-operated with Dr. O'Brien, Superintendent of the Hampshire County Sanatorium in conducting clinics in Hampshire County. The Hampden County Public Health and Tuberculosis Association has been very active in arranging clinics in the smaller towns, so that, with the city dispensary the county as a whole has been well covered. We have examined a total of 1,286 patients at these clinics.

The Sanatorium Out-patient Service has increased in a satisfactory way,—187 persons were given a physical examination and 154 X-ray examinations were made of out-patients. One out-patient has been given pneumothorax treatment with good results.

The total number of persons examined therefore, including Consultation Clinics, Examination Clinics and Out-patients for the year has been 1,642, as compared with 583 in the preceding year. This is a most satisfactory showing and indicates that the Westfield State Sanatorium is becoming the center for tuberculosis work in the surrounding territory. This is as it should be. In this connection I wish to call attention to the whole-hearted co-operation and hard work done by Drs. Roy Morgan and Heman

B. Chase in making this service available and of value to the people of Western Massachusetts.

The Public Health Associations of Hampden, Hampshire, Franklin and Berkshire Counties are doing splendid work. They supplement and co-operate with the official agencies in their respective localities in a most satisfactory way. Their relations with this sanatorium are most friendly and mutually helpful.

DENTISTRY.

The total amount of work done this year is not as large as in previous years because there was an interim of several months after Dr. Bethell's resignation in June when we had the services of a part time dentist from Westfield. It was impossible for him to do the necessary work in the limited time at his disposal. Dr. Thomas W. Loft was appointed November 22nd, 1922, as a resident dentist. The following is the report in detail of the year's work:—

Number of patients examined	433
Number of Prophylaxis	418
Number of Extractions	180
Number of Amalgam Fillings	232
Number of Cement Fillings	292
Number of Synthetic Porcelain Fillings	3
Number of Temporary Stopping Treatments	158
Number of Pulp Cappings	81
Number of R. C. Dressings	115
Number of R. C. Fillings	23
Number of Gum Treatments	16
Number of Devitalizations	20
Number of Drainage & Irrigations	57
Number of Radiographs	19
Number of Full upper and lower restorations	1
Number of Davis Crowns	4
Total number operations	2,052

SANATORIUM SCHOOL.

With the admission of more children the schoolrooms are crowded. More desks are necessary and the space to put them is limited. An addition to the school building to provide more classrooms will be necessary another year. The daily average attendance has increased from 134 last year to 185 this year. The children have done most excellent work in the craft shop. The baskets and other finished products have become well known locally and find a ready sale. Our receipts from baskets, bags and cards this year have been \$646.51. This money is used as a revolving fund to provide raw material. The school work has been kept up to the standard of the public school.

Average Daily Attendance.

Grade I	19.01
Grade II	23.49
Grade III	15.31
Grade IV	17.35
Grade V	29.53
Grade VI	13.52
Grade VII	20.63
Grade VIII	8.37
Domestic Science	19.50
Manual Training	17.88
Total	184.59

FARM.

The farm has made a very satisfactory showing in spite of the handicap of having had an excessive rainfall during the summer. The rain injured many of our farm crops, especially the late potatoes and some of the garden produce. The value of the farm products was as follows:—

Milk	\$18,947 00
Pork	3,072 00
Vegetables	3,284 00
Hay, grain & green feed	3,247 00
Total	\$28,550 00

These have been figured at the prices fixed by the Auditor.

IMPROVEMENTS.

We had no Special Appropriations last year. Out of our Maintenance Appropriation we constructed a tunnel from the power house to the school building at an expense of \$2,700. The old wooden shingles on wards and buildings were replaced with asbestos tile, thereby making more durable roofs and decreasing the fire hazard. The locker room of the west ward has been enlarged and improved. A new 25 h.p. motor was purchased for the new ice machine. A pump house was constructed adjacent to the power house and a new sewer pump installed therein.

RECOMMENDATIONS.

Cottage House for Superintendent. — The assistant physician's quarters in the administration building are inadequate. The dining room used by the assistant physicians, nurses, office staff, teachers and attendants is badly crowded. The best solution of the problem is to have the superintendent's family occupy a separate house. When one is provided the assistant superintendent could occupy part of the quarters now used by the superintendent, and the large dining room could be used for the physicians, office staff and teachers. If the outside clinic work continues to increase in the future as it has in the past year, the addition of another physician to the staff will soon be necessary. Estimated cost of cottage \$12,000.

Dairy Barn. — A large percentage of our cows react to the tuberculin test. In order to obtain a tuberculosis free herd it will be necessary to have another barn where we can keep separate the known reactors and the new born calves. The barn we now have is large enough to hold sufficient cows to produce the milk needed for our present population. If, however, the institution should some time be enlarged it would then be necessary to increase the herd and a second barn will be required. To replace by purchase, the cows we now have with tested stock, would require an expenditure of about \$10,000. Estimated cost of barn \$13,348.

Pasture. — We need a pasture near the sanatorium for our young stock and dry cows. A tract of 56.9 acres has recently come into the market on account of the death of the owner and can be purchased for \$900. It is situated within a convenient distance and with a small amount of double fencing the cattle could be kept from contact with other herds. Our annual expense for rental of pasture during the past few years has averaged \$60.

ACKNOWLEDGMENTS.

Catholic, Protestant and Jewish services have been held each Sunday during the year. With the elimination of the adult patients it was found desirable to employ a Sunday school teacher instead of a clergyman for the Protestant services. Miss Helen Jarrold, of Westfield, a trained Sunday school teacher and pastor's assistant, has given very satisfactory service in this capacity. The Catholic and Jewish chaplains have continued as before.

Many gifts, magazines, books, toys and games have been contributed in greater numbers than ever before. This shows increased interest by the public in the work of the sanatorium since it has been devoted exclusively to the care of children.

EMPLOYEES.

I have been very fortunate in being able to retain the services of the physicians, office force, heads of departments and nurses with very few changes in personnel. During my two months' absence this summer the work of the sanatorium was carried on in a most efficient manner. The service of the staff and employees during that period, and in fact at all times, deserves my most sincere commendation.

HENRY D. CHADWICK,
Superintendent.

VALUATION.

<i>Land.</i>		
Grounds (25.8 acres)		\$5,100 00
Lawns and buildings, 25.8 acres.		
Roads.		
Woodland (97.6 acres)		4,764 00
Mowing (3.1 acres)		232 50
Tillage (52.5 acres)		3,887 50
Tillage, 46.5 acres.		
Garden, 6 acres.		
Orchard (2 acres)		400 00
Pasture (13.1 acres)		747 00
Waste and miscellaneous (12.6 acres)		690 50
Rough pasture, 7.6 acres.		
Meadow swamp land.		
Sewer beds, 4 acres.		
New coal trestle, 1 acre.		
		<hr/>
Sewerage system		\$15,821 50
		<hr/>
Total		\$29,175 30
<i>Buildings.</i>		
Institution buildings		\$160,392 29
Farm, Stable and Grounds		23,864 00
Miscellaneous		47,621 90
		<hr/>
		231,878 19
		<hr/>
		\$261,053 49
Present value of all personal property as per inventory of Dec. 1, 1922		94,319 94
		<hr/>
		\$355,373 43

STATISTICAL TABLES.

TABLE 1. — *Admissions and Discharges.*

	Males.	Females.	Totals.
Number of patients admitted Dec. 1, 1921, to Nov. 30, 1922, inclusive	128	139	267
Number of patients discharged Dec. 1, 1921, to Nov. 30, 1922, inclusive	137	135	272
Number of deaths (including those in previous item)	8	14	22
Number in sanatorium Dec. 1, 1921	144	128	272
Number remaining Nov. 30, 1922	135	132	267

TABLE 2. — *Civil Condition of Patients admitted.*

	Males.	Females.	Totals.
Married	—	6	6
Single	128	130	258
Widowed	—	3	3.
Totals	128	139	267

TABLE 3. — *Ages of Patients admitted.*

	Males.	Females.	Totals.
1 to 13 years	107	89	196
13 to 20 years	19	41	60
21 to 30 years	2	3	5
31 to 40 years	—	4	4
41 to 50 years	—	1	1
51 to 60 years	—	1	1
	128	139	267

TABLE 4. — *Nativity and Parentage of Patients admitted.*

PLACES OF NATIVITY.	MALES.			FEMALES.			TOTALS.		
	Patients.	Fathers.	Mothers.	Patients.	Fathers.	Mothers.	Patients.	Fathers.	Mothers.
United States:									
Massachusetts	104	33	31	92	21	20	196	54	51
Other N. E. States	2	5	6	14	11	6	16	16	12
Other States	4	8	4	12	12	10	16	20	14
Total Natives	110	46	41	118	44	36	228	90	77
Other Countries	10	57	60	14	70	73	24	127	133
Unknown	8	25	27	7	25	30	15	50	57
Grand Totals	128	128	128	139	139	139	267	267	267

TABLE 5. — *Occupation of Cases admitted.*

	Males.	Females.	Totals.
Corset Shop	—	1	1
Domestic	—	1	1
Housewife	—	5	5
Laboratory Worker	1	—	1
Mill Worker	2	2	4
School	125	129	254
Seamstress	—	1	1
Totals	128	139	267

TABLE 6. — *State of Disease at Admission.**Adults.*

	Males.	Females.	Totals.	Percentage.
Minimal	4	4	8	3.00
Mod. Advanced	6	9	15	5.62
Far Advanced	3	12	15	5.62
Unclassified	—	—	—	—
Non-Tuberculous	—	—	—	—
	13	25	38	14.24

Children under Sixteen Years of Age.

Minimal	97	73	170	63.67
Mod. Advanced	11	29	40	14.98
Far Advanced	4	11	15	5.62
Unclassified	—	—	—	—
Non-tuberculous	1	—	1	.37
Bone Tuberculous	1	1	2	.75
Pulmonary Abscess	1	—	1	.37
	115	114	229	85.76
Totals	128	139	267	100.00

TABLE 7. — *Condition on Discharge.**Adults.*

	Males.	Females.	Totals.	Percentage.
Apparently Arrested	12	10	22	8.09
Quiescent	8	2	10	3.67
Improved	5	6	11	4.05
Unimproved	4	8	12	4.41
Died	5	9	14	5.14
Non-tuberculous	—	—	—	—
Not Considered	1	—	1	.37
Totals	35	35	70	25.73

Children under Sixteen Years of Age.

Apparently Arrested	74	72	146	53.68
Quiescent	4	5	9	3.31
Improved	13	5	18	6.62
Unimproved	5	8	13	4.78
Died	3	5	8	2.94
Non-tuberculous	—	—	—	—
Not Considered	3	5	8	2.94
	102	100	202	74.47
Totals	137	135	272	100.00

TABLE 8. — *Deaths.*

DURATION OF DISEASE.	Males.	Females.	Totals.	LENGTH OF RESIDENCE AT SANATORIUM.		
				Males.	Females.	Totals.
Under 1 month	—	—	—	1	1	2
1 to 2 months	—	—	—	—	3	3
2 to 3 months	—	—	—	—	2	2
3 to 4 months	—	1	1	—	2	2
4 to 5 months	—	—	—	2	—	2
5 to 6 months	—	1	1	—	1	1
6 to 7 months	—	2	2	—	2	2
7 to 8 months	—	—	—	—	—	—
8 to 9 months	—	1	1	—	—	—
9 to 10 months	—	—	—	—	1	1
10 to 12 months	—	1	1	2	2	4
12 to 18 months	1	—	1	1	—	1
18 to 24 months	—	2	2	—	—	—
Over 2 years	6	7	13	1	1	2
Totals	7	15	22	7	15	22

TABLE 9. — *Cause of Death.*

	Males.	Females.	Totals.
Tuberculosis of the Lungs	3	14	17
Tuberculosis of Lungs and Bowels	1	—	1
Tuberculosis of Larynx and Lungs	1	—	1
Tuberculosis of Lungs and Bronchiectasis	1	—	1
Tuberculosis of Lungs and Meningitis	—	1	1
Abscess of the Lungs	1	—	1
Totals	7	15	22

NORTH READING STATE SANATORIUM.

RESIDENT OFFICERS.		
CARL C. MACCORISON, M.D.	.	Superintendent.
EARLE C. WILLOUGHBY, M.D.	.	Assistant Superintendent.
JOSEPH W. REDDY, M.D.	.	Physician.
SAMUEL RANDALL	.	Dentist.
CATHERINE RYAN, R.N.	.	Supervisor of Nurses.
MIRA B. ROSS	.	Head Matron.
J. ELLIS DOUCETTE	.	Steward.
DANIEL J. SCOTT	.	Chief Engineer.
EDWARD LEARY	.	Farmer.

REPORT OF THE SUPERINTENDENT.

To EUGENE R. KELLEY, M.D., *Commissioner, Department of Public Health, State House, Boston.*

I have the honor to submit the 14th annual report of the North Reading State Sanatorium for the year ending Nov. 30, 1922.

During the year there has been expended \$146,401.16 for maintenance, a gross weekly per capita cost of \$14.5803 and \$20,205.18 from the appropriations authorized by Chapter 203, Resolves of 1921. For the X-Ray machine and equipment \$4,299.76; for the Insulation of Underground Main \$3,998.24; and for glazing in the pavilions and additions to locker rooms \$32,969.74, all under Chapter 129, Acts of 1922.

There has been collected from miscellaneous sources \$29,705.63 (the total of all collections). Deducting this amount from the gross maintenance expenses leaves a net expense of \$116,695.53. The net weekly per capita cost was \$11.6228. There has been collected from private funds \$7,287.80; from cities and towns \$21,616.07; from U. S. Veterans' Bureau (included in private cases). 53 cases were supported wholly or in part by private funds; 115 by cities and towns; 35 wholly by the State; 2 by the United States Veterans' Bureau.

There were 201 patients in the Sanatorium at the beginning of the year, 191 at the close. The largest number present at any one time was 202, and the smallest 180. The daily average number of patients was 193.09. There were 238 cases admitted during the year; 23 minimal (or incipient); 104 moderately advanced; 107 advanced; 4 unclassified. There were 190 cases admitted from cities and towns of over 25,000 population, and 48 from cities and towns under 25,000 population. The average age of patients admitted was 30.77. Including deaths, there were 249 discharged, and the average duration of residence was 13 months and 8 days. Of those discharged 151 gained 2,246 pounds, an average gain of 14.1 pounds per person. Of the discharges there were 8 arrested cases, the same as last year; 3 apparently arrested; one less than last year; 30 quiescent; 13 more than last year; 110 improved and 49 unimproved. There were 11 patients Not Considered, the duration of treatment being less than one month. There were 36 deaths, 3 less than last year, and 2 discharged Non-Tuberculous. There were 70,477 hospital days of treatment, 3,810 more than last year.

The following table shows the classification on the application blank and our classification of admission:—

	Classification on Appli- cation Blanks.	Our Classifica- tion on Admission.
Incipient	75 ¹	23
Moderately Advanced	136	104
Advanced	26	107
Unclassified	1	4
	238	238

¹ Minimal.

MEDICAL REPORT.

Consultation Clinics have been held monthly during the past year at Haverhill, Lowell, Lawrence and Woburn. A total of 101 patients were examined as against 143 for the previous year. The Woburn clinic has been poorly attended, only five patients having been referred for examination last year. The following tabulation shows the number of cases referred to these clinics:—

Haverhill	29
Lowell	20
Lawrence	47
Woburn	5
	<hr/> 101

In addition to the above, 5 physicians practicing in the smaller towns within a radius of 5 to 15 miles from North Reading, referred 5 cases direct to the Sanatorium, and 2 patients not under the care of a physician applied for examination, thus making a total at the end of the year of 108 cases. Of the 108 cases examined, 28 were classified as active Pulmonary Tuberculosis; 10 as Inactive; 70 as suspects.

Examination Clinics for underweight school children have been held in six towns as follows:—

Nahant	45
Tyngsborough	17
Dunstable	14
Ayer	46
Lincoln	40
Littleton	28
Total	<hr/> 190

Clinics were also held in the City of Lowell for Contact cases, irrespective of age. At these clinics 347 cases were examined, classified as follows:—

Non-pulmonary	3
Tuberculous	78 ¹
Non-tuberculous	202
Observation	64

Examinations were made of Suspects at the Massachusetts Reformatory on March 29, 1922, and July 21, 1922. A total of 33 patients were examined at these clinics and classified as follows:—

Tuberculous	5
Non-tuberculous	11
Observation	17

During the past year, we have tried to follow out the policy of confining all newly admitted patients to bed, for a period of at least one month. Beneficial results accruing to the patients from absolute rest in bed during those first few weeks of treatment have proved most gratifying, and although it has thrown additional work and responsibility on our physicians and nurses, we feel that we should continue the policy.

The following table is a summary of the work accomplished by our dentist during the year:—

Number of patients examined	392
Prophylaxis	280
Extractions	257
Pyorrhea	11
Vulcanite plates	10
Synthetic fillings	40
Cement fillings	35
Silver fillings	40
Gold fillings	12
Temporary fillings	25
Plates repaired	4
Crowns	11
Defective crowns & bridges removed	14

Climatic conditions have not been altogether favorable for good crops. The garden on the whole, however, was fairly satisfactory.

¹ Nine new cases.

IMPROVEMENTS.

The fire protective system has been completed, and an up-to-date X-ray outfit installed. New toilet and locker rooms for the two hospital wards and pavilion A were built; the fronts of pavilions A and B glazed in; steam extended to the sleeping wings and the underground mains recovered. A large retaining wall was built near the men's smoking camp, additional cement walks laid down, surface drainage improved north of the Administration building, repairs made to the drive, and various improvements to the grounds.

RECOMMENDATIONS.

Last year's appropriation for the locker and toilet rooms was not sufficient to cover the "B" pavilions. These additions should be made this coming year.

Plans and estimates for the addition to the farmhouse for the accommodation of twelve male employees were filed last year, although no appropriation was made to carry out the work. This is a much needed improvement, and should receive serious consideration. If we are to extend the scope of our medical work, it will be necessary to provide additional accommodations for the staff. Plans and estimates have been obtained for a cottage for the Superintendent. On the completion of such a building, the present quarters used by the Superintendent can be given over to the staff without making alterations.

We have reached a point where our generators are constantly needing repairs. One unit is not sufficient to carry the peak load, and should a serious breakdown occur to either unit, we would be tremendously handicapped. I would recommend that a new 50 KW generator and engine be installed this coming year.

ACKNOWLEDGMENTS.

Religious services have been held each Sunday by the Catholic and Protestant chaplains, and on Tuesdays by the Jewish chaplain. I wish to express my appreciation for their untiring efforts on behalf of our patients and employees. The Rev. Frederick Walsh resigned in January, 1922, to accept a pastorate in Connecticut, and the Rev. J. Herbert Jones was appointed to fill the vacancy.

On behalf of the patients I wish to express my appreciation of gifts of books, flowers, magazines, and am especially grateful to the Social Service Council of Unitarian Women of Winchester for the gift of a portable organ for ward use.

I am much indebted to the heads of departments and their subordinates for their faithful co-operation.

Respectfully submitted,
CARL C. MACCORISON,
Superintendent.

VALUATION.

Land.

Grounds (11.82 acres)	\$569 37
Lawns and buildings, 11.07 acres.	
Roads, .75 acre.	
Woodland (23.99 acres)	1,155 60
Mowing (15.584 acres)	750 68
Tillage (7.05 acres)	339 60
Tillage, 1.25 acres.	
Garden, 5.80 acres.	
Orchard (2.61 acres)	125 72
Pasture (2.09 acres)	100 67
Waste and Miscellaneous (38.61 acres)	1,859 84
Rough pasture, 7.86 acres.	
Meadow Swamp land, 30 acres.	
New coal trestle, .75 acre.	
Sewerage system	\$4,901 48
	7,567 31
	<hr/>
	\$12,468 79

Buildings.

Institution Buildings	\$175,588 68
Farm, Stable and Grounds	16,392 00
Miscellaneous	92,131 34
	<hr/>
	284,112 02
	<hr/>
	\$295,580 81
Present value of all personal property as per inventory of December 1, 1922	91,562 02
	<hr/>
Grand Total	\$387,142 83

STATISTICAL TABLES.

TABLE 1. — *Admissions and Discharges.*

	Males.	Females.	Totals.
Patients in Sanatorium Dec. 1, 1921	113	88	201
Patients admitted from Dec. 1, 1921, to November 30, 1922, inclusive	132	106	238
Patients discharged from Dec. 1, 1921, to November 30, 1922, inclusive	141	108	249
Patients remaining in Sanatorium November 30, 1922	105	86	191
Daily average number patients	109.07	84.02	193.09
Deaths (included in number discharged)	24	12	36

TABLE 2. — *Civil Condition of Patients admitted.*

	Males.	Females.	Totals.
Single	67	48	115
Married	60	55	115
Widowed	5	2	7
Divorced	—	1	1
	132	106	238

TABLE 3. — *Age of Patients admitted.*

	Males.	Females.	Totals.	Percentage.
Under 14 years to 20	13	15	28	11.77
20 to 30 years	47	53	100	42.01
30 to 40 years	36	27	63	26.47
40 to 50 years	24	11	35	14.71
Over 50 years	12	—	12	5.04
	132	106	238	—
Average Age	27.2	33.1	30.77	—

TABLE 4. — *Nativity and Parentage of Patients admitted.*

PLACE OF NATIVITY.	MALES.			FEMALES.			TOTALS.		
	Patients.	Fathers.	Mothers.	Patients.	Fathers.	Mothers.	Patients.	Fathers.	Mothers.
United States:									
Massachusetts	57	14	25	52	21	16	109	35	41
Other N. E. States	13	9	8	6	6	6	19	15	14
Other States	6	5	5	3	5	3	9	10	8
Total Native	76	28	38	61	32	25	137	60	63
Other Countries	56	101	91	45	73	79	101	174	170
Unknown	—	3	3	—	1	2	—	4	5
Grand Totals	132	132	132	106	106	106	238	238	238

TABLE 5. — *Occupation of Patients admitted.*

	Males.	Females.		Males.	Females.
Accountant	1	2	Mill operator	4	7
Bartender	1	—	Model (Painter's)	—	1
Barber	1	—	None	—	4
Baker	3	—	Nurse	—	3
Bellboy	1	—	Optician	1	—
Boilermaker	1	—	Orderly	1	—
Bookkeeper	1	4	Plumber	2	—
Butcher	1	—	Police Officer	1	—
Cabinetmaker	1	—	Porter	2	—
Carpenter	5	—	Pedler	2	—
Civil Engineer	1	—	Photographer	1	—
Clerk	19	12	Printing Inspector	—	1
Chauffeur	6	—	Roofor	1	—
Chef	1	—	Salesman	2	—
Companion	—	1	Seaman	1	—
Cook	—	1	School Teacher	1	1
Chambermaid	—	1	Shoe Polisher	2	—
Dentist	—	1	Secretary	—	1
Domestic	—	11	Social Worker	—	1
Electrotyper	1	—	Stenographer	—	3
Elevator Boy	1	—	Sign Painter	1	—
Factory Worker	3	6	Shoe Worker	11	—
Farmer	1	—	Student	2	—
Fireman	1	—	Surveyor	1	—
Hairdresser	—	1	Tailor	4	—
Housewife	—	42	Tailoress	—	1
Interior Decorator	1	—	Tanner	1	—
Janitor	1	—	Teamster	4	—
Laborer	14	—	Tel. operator	1	1
Laundress	—	1	Undertaker	1	—
Lawyer	1	—	Waitress	—	1
Leatherworker	2	—	Waiter	1	—
Moving picture operator	1	—			
Machinist	7	—	Totals	132	106
Mechanic	1	—		238	
Metal Worker	4	—			
Merchant	2	—			

TABLE 6. — *Stage of Disease on Admission.*

	Males.	Females.	Totals.	Percentage.
Minimal	15	8	23	9.66
Mod. Advanced	62	42	104	43.69
Advanced	52	55	107	44.95
Unclassified	3	1	4	1.70
Totals	132	106	238	100.00

TABLE 7. — *Condition on Discharge.*

	Males.	Females.	Totals.	Percentage.
Non-Tuberculous	1	1	2	.83
Apparently Arrested	3	—	3	1.20
Arrested	4	4	8	3.21
Quiescent	25	5	30	12.05
Improved	51	59	110	44.18
Unimproved	25	24	49	19.66
Not Considered	8	3	11	4.41
Died	24	12	36	14.46
Totals	141	108	249	—

TABLE 8. — *Deaths.*

DURATION OF DISEASE.	Males.	Females.	Totals.	LENGTH OF RESIDENCE AT SANATORIUM.		
				Males.	Females.	Totals.
Under 1 month	—	—	—	—	2	2
1 to 2 months	—	—	—	2	—	2
2 to 3 months	—	—	—	1	1	2
3 to 4 months	1	—	1	2	—	2
4 to 5 months	—	—	—	5	—	5
5 to 6 months	—	—	—	—	3	3
6 to 7 months	—	—	—	—	—	—
7 to 8 months	2	1	3	1	—	1
8 to 9 months	1	1	2	—	—	—
9 to 10 months	—	—	—	—	2	2
10 to 12 months	—	1	1	—	1	1
12 to 13 months	2	—	2	—	2	2
18 to 24 months	3	2	5	4	—	4
Over 2 years	15	7	22	9	1	10
Totals	24	12	36	24	12	36

TABLE 9. — *Cause of Death.*

	Males.	Females.	Totals.
Tuberculosis of Lungs	24	12	36
Totals	24	12	36

REPORT OF THE STATE EXAMINERS OF PLUMBERS.

Information concerning Examinations for Plumbers, showing the Place and Date of Examination and Number examined, together with the Results of the Examination, etc.

EXAMINATIONS.	Examined.	Passed.	Refused.
Boston Dec. 3, 1921	63	19	44
Lowell Dec. 17, 1921	43	12	31
Boston Jan. 7, 1922	73	19	54
Pittsfield Jan. 21, 1922	15	5	10
Boston Feb. 4, 1922	91	18	73
Springfield Feb. 18, 1922	42	11	31
Boston March 4, 1922	104	11	93
Fall River March 18, 1922	42	13	29
Boston April 1, 1922	98	20	78
Worcester April 15, 1922	46	8	38
Boston May 6, 1922	86	14	72
Lowell May 20, 1922	47	10	37
Boston June 3, 1922	93	19	74
Pittsfield June 17, 1922	27	7	20
Boston July 1, 1922	85	21	64
Boston Sept. 2, 1922	91	19	72
Springfield Sept. 16, 1922	35	7	28
Boston Oct. 7, 1922	96	16	80
Fall River Oct. 21, 1922	33	8	25
Boston Nov. 4, 1922	56	12	44
Worcester Nov. 18, 1922	35	12	23
Totals	1,301	281	1,020

	Masters.	Journeymen.	Total.
Licenses granted on account of Examination, Dec. 1, 1921, to Dec. 1, 1922	126	166	292
Probationary licenses issued during year	-	3	3

REGISTRATIONS.	Masters.	Journeymen.
Dec., 1921	-	2
Jan., 1922	2	1
Feb., 1922	-	1
March, 1922	-	2
April, 1922	1	1
May, 1922	1	-
June, 1922	2	3
July, 1922	1	3
August, 1922	1	1
Sept., 1922	1	1
Oct., 1922	-	1
Nov., 1922	-	1
Totals	9	17

Meetings	48	Examinations	21
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FEES RECEIVED.		Paid to Treasurer of Common- wealth.
1,301 Examination Fees, at \$0.50		\$650 50
135 M. P. Licenses issued, at \$2		270 00
183 J. P. Licenses issued, at \$0.50		91 50
1,856 M. P. Renewals, at \$0.50		928 00
4,084 J. L. Renewals, at \$0.50		2,042 00
210 Back Fees, at \$0.50		105 00
		<hr/> \$4,087 00
Interest, May, 1922		1 81
Interest June, 1922		1 29

For carrying out the Provisions of the Act relative to the Examiners of Plumbers.

Appropriation	\$5,000 00
Salaries	\$3,441 18
Travel	623 22
Express	42 54
Printing	108 13
Postage	129 00
Books and stationery	78 97
Telephone	61 05
Heat and light	49 47
Plumbers' materials	11 60
Extra services	19 50
Cleaning	34 00
Total	<hr/> \$4,598 66
Unexpended balance	401 34
	<hr/> \$5,000 00

Summary of Registrations.

	Masters.	Journeymen.
Certificate holders (individuals)	472 ¹	478
Licenses, year ending May 1, 1922 (individuals)	1,119 ²	3,745
Totals	<hr/> 1,591	<hr/> 4,223

¹ Holding Journeyman also, 314.

² Holding Journeyman also, 991.

Number of last Master License issued up to August 1, 1922	3,117
Number of last Master License issued	3,142
Number of last Journeyman License issued up to August 1, 1922	6,941
Number of last Journeyman License issued	6,982

Deceased Plumbers reported to Examiners.

Masters	17	Journeymen	9
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DAVID CRAIG,
Clerk.

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MASSACHUSETTS STATISTICS FOR 1923.

Estimated population	3,969,536
Death rate per 1,000 population	13.2
Infant Mortality	78.1 per 1,000 live births

The Commonwealth of Massachusetts

DEPARTMENT OF PUBLIC HEALTH,
BOSTON, Jan. 16, 1924.

To the General Court of Massachusetts.

In accordance with the provisions of section 32 of chapter 30 of the General Laws I have the honor to submit herewith the annual report of the Department of Public Health for the year ended Nov. 30, 1923.

Respectfully,

EUGENE R. KELLEY,
Commissioner of Public Health.

NINTH ANNUAL REPORT

OF THE

Department of Public Health of Massachusetts

REPORT OF THE PUBLIC HEALTH COUNCIL

For the fiscal year ended November 30, 1923, the State Department of Public Health was constituted as follows:

Commissioner of Public Health EUGENE R. KELLEY, M.D.

PUBLIC HEALTH COUNCIL.

EUGENE R. KELLEY, M.D., *Chairman*.

GEORGE C. WHIPPLE, S.B., 1923. ¹	WARREN C. JEWETT, 1925.
RICHARD P. STRONG, M.D., 1926.	SYLVESTER E. RYAN, M.D., 1925.
JAMES L. TIGHE, B.A.Sc., C.E., 1926. ²	J. E. LAMOUREUX, M.D., 1924.
ROGER I. LEE, M.D., 1924.	

During the year 15 formal meetings were held, as well as many meetings of standing committees and special boards. The standing committees of the Council are as follows:

SANITARY ENGINEERING (INCLUDING HOUSING AND RURAL HYGIENE).

Mr. Tighe, Dr. Kelley, and Mr. Jewett.

PREVENTIVE MEDICINE AND HYGIENE.

Drs. Lee, Kelley, Lamoureux, Ryan, and Strong.

FOOD AND DRUGS.

Drs. Lamoureux and Ryan and Mr. Jewett.

LABORATORY WORK AND RESEARCH.

Drs. Strong and Kelley and Mr. Tighe.

PUBLICATIONS.

Drs. Ryan and Lamoureux and Mr. Tighe.

Upon the expiration of Professor Whipple's term in May, 1923, he requested the Governor not to reappoint him because of the pressure of personal affairs. Professor Whipple was one of the two remaining members of the Public Health Council originally appointed by the Governor in 1914 following the creation of the State Department of Health under the provisions of Chapter 792 of that year, Dr. Lamoureux being the other charter member. The announcement of Professor Whipple's decision was received with much regret by his fellow council members and associates in the Department and at a meeting of the Public Health Council on July 10, 1923, it was voted to spread upon the records the following recognition of his services:

"To the activities of a vast practice and a professorship in Sanitary Engineering, Prof. George C. Whipple added, in 1914, the responsibilities of a Councillor of the, then new, State Department of Health.

"He who had so consistently worshiped at the shrine of that trinity of Success: Experience, Research, Organization, found here a wide field for the profession of his faith.

"How intensive and thorough was his work, we, of the Council, appreciate in wonderment of his resourcefulness in finding the necessary time.

¹ Resigned May, 1923.

² Appointed May 1, 1923.

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1923
"Because of his knowledge, national and international affiliations, Prof. Whipple was the permanent committee, now passing through the sieve of the Analyst the work of the day, and then, with the vision of the Builder, illuminating the problems of the morrow.

"Practitioner, Author, Teacher, Propagandist in the eyes of the world; to us, of the Public Health Council, he was the devoted co-worker whose shoulders never shirked a load, whose brow never moulded a frown.

"That his re-arranged life may bring to him, in success and contentment, a fair compensation for his generous contribution to State and Nation, is the wish of his former associates."

To fill the vacancy in the membership of the Council, the Governor on May 23, 1923, appointed Mr. James L. Tighe of Holyoke, a well-known civil engineer of wide experience. Mr. Tighe has taken the office of Chairman of the Committee on Sanitary Engineering and is ably discharging the duties of that position.

On July 10, 1923, Mr. Warren C. Jewett was appointed by the Commissioner to represent the Department and to serve as a member of the State Reclamation Board under the provisions of Chapter 457, Acts of 1923, Mr. Jewett having served in a similar capacity on the Drainage Board.

In accordance with statute, public hearings have frequently been held for the purpose of taking evidence and gathering data before reaching decisions or granting approvals required by law on the taking of lands by cities or towns for the protection of water supplies; on plans for systems of water supply and sewage disposal; on plans for hospitals for communicable diseases, police stations, etc.; on petitions for the abatement of nuisances of various types, notably among these being certain oil-refining plants declared or alleged to be so operated as to create a nuisance; and on various rules and regulations, State and municipal, relative to cold storage, slaughtering, and the protection of foods and drugs, and rules and regulations for the control of communicable diseases.

At various times throughout the year as the work of the Department indicated the Council in a body has visited and inspected oil-refining plants and fertilizer and garbage disposal plants, concerning which complaint had been made to the Department, and also sewer outlets. The Council has also taken views of the premises involved in the studies and investigations being made by the Department under the legislative resolves passed in 1923 concerning sewerage and sewage disposal in the valley of the Merrimack River (Chapter 49) and relative to sewerage and sewage disposal for the cities of Salem, Beverly, and Peabody, and the town of Danvers (Chapter 64). The Council has also considered and voted to submit to the Legislature a report based on a report made by the Special Plumbing Board appointed by the Commissioner, Mr. Tighe, Chairman, relative to the advisability of standardizing municipal regulations as to plumbing and drainage as provided by Chapter 6 of this year's resolves.

In addition, the Council has considered matters submitted to it by the Commissioner concerning the development and extension of the Department's programs for the control of tuberculosis and diphtheria, appointments required to be made by law, administrative changes and various other matters affecting the public health and welfare. At all times, the Council members, every one of them active in their professions and with many demands upon their time, have given to the Department's problems the closest attention and the benefit of their judgment and experience.

At the meeting of the Public Health Council on Jan. 11, 1924, the Commissioner of Public Health presented to the Council a report of the activities of the Department for the fiscal year 1923 together with recommendations for legislation, and it was voted that this report, together with the foregoing brief summary of the duties of the Public Health Council, be approved and adopted as the report of the State Department of Public Health for the fiscal year 1923.

NINTH ANNUAL REPORT OF THE COMMISSIONER OF
PUBLIC HEALTH

To the Public Health Council:

GENTLEMEN: — I have the honor to submit herewith my report of the activities of the Department of Public Health for the year ending Nov. 30, 1923.

DISEASES DANGEROUS TO THE PUBLIC HEALTH.

In accordance with a custom of some years' standing, I shall present here a very brief résumé of the principal features of the past year concerning the record of diseases dangerous to the public health. Statements made here must be partly in the nature of estimates inasmuch as it has been found advisable to give the statistics of diseases for the calendar rather than the fiscal year for the purpose of avoiding confusion and to make the figures for this State comparable with those of other States. Prior to the printing of the report, the final corrected figures for cases and deaths for the calendar year are inserted.

In surveying the picture of communicable disease prevalence for the past year, a distinct increase in the number of cases reported of many of the communicable diseases is seen in contrast to the records of the preceding two years; in fact, but two of the more common diseases, typhoid fever and tuberculosis, show any lessened prevalence or diminished number of deaths. To offset this somewhat disappointing record it is nevertheless fitting to point out that on the other hand no alarming or disastrous epidemics have occurred, the year presenting a new low record for outbreaks of communicable diseases. The increased frequency of cases represents a scattered, slight increase general throughout the State. In only 22 instances during the entire fiscal year were there reported instances of increased prevalence of communicable diseases sufficiently marked to require a special investigation, and as previously stated in none of these instances mentioned did epidemics of any magnitude ensue.

From present estimates it appears that the total number of deaths as well as the total number of cases reported will be higher for lobar pneumonia, influenza, measles, and whooping cough than was the case in either 1922 or 1921. Diphtheria, cerebrospinal meningitis, and infantile paralysis show very slight variations from the previous year.

The increase in the frequency and fatality of lobar pneumonia and whooping cough during 1923 has been very noticeable and largely accounts for the increase of both cases and deaths for the entire group of diseases listed as dangerous to the public health. The reports for whooping cough show substantially twice the number of cases and deaths as reported in 1922. In the case of lobar pneumonia, the total number of cases reported was not markedly greater than the previous year, approximately 5,000 cases for each year, but the excessively high mortality of the disease in January and February, 1923, resulted in a decided increase in the number of deaths for the year. It is at least suggestive that these two months of high pneumonia fatality correspond to the period of greatest suffering in this State due to an insufficient supply of coal for domestic use.

The fluctuations in the prevalence and fatality of measles and whooping cough, when studied over a series of years and the fact that in the years of high prevalence they far surpass typhoid fever or scarlet fever in fatality, emphasize the lamentable fact that as yet there have been developed no satisfactory control measures for these two serious maladies of infancy and early childhood.

Scarlet fever has continued to be unusually prevalent throughout the year but fortunately the disease has been of a mild type and at present it seems practically certain that the deaths will exceed but slightly those of last year.

In my last annual report I commented on the fact that in 1922 typhoid fever had established a new low record for both prevalence and fatality. This statement can again be repeated for the year 1923. But two outbreaks of the disease, both of them of only a few cases, were reported. Two features in reference to the typhoid situation in 1923 deserve particular mention. The first is that for the first time in the history of typhoid in Massachusetts the number of deaths from the disease per 100,000 of the population has fallen below 2. This has been a mark which has been previously reached by many of our larger cities, but never

before for the entire State and one which has been reached in but one or two other instances in the United States. The other noticeable fact in reference to typhoid is that for the first time since the records of this disease have been kept there occurred no "autumnal peak," so called, of typhoid deaths for the State as a whole for the months of August, September, and October of this year, although several of the large cities of the country where typhoid has been exceptionally well controlled have for some years past been able to overcome the fall typhoid peak in deaths.

Tuberculosis shows a slight decline in fatality compared with 1922. This fact is of particular importance because, as was noted in my last annual report, the decline for the last few years has been so pronounced that it should occasion no surprise if no decline is noted for a few years. A decrease much more pronounced than in the case of consumption is to be noted for forms of tuberculosis other than consumption. For the past four years the deaths from forms of tuberculosis other than consumption have decreased substantially 50 in number each succeeding year.

This very brief consideration of the communicable disease situation during the past year in the State as a whole may perhaps well serve as a suitable introduction to what is the most important subject before this Department for consideration at the present time. I refer to the program for the prevention of tuberculosis in childhood.

THE PROPOSED TUBERCULOSIS PREVENTION PROGRAM OF THE DEPARTMENT.

All members of this Department have followed with close interest for several years past the gradual development of the work which has been carried on by this Department in the field of detection, prevention, and cure of tuberculosis in children. This project was first conceived, formulated and developed under the stimulating leadership of Dr. Henry D. Chadwick, Superintendent of the Westfield State Sanatorium. The members of the executive staff generally, and especially the field force, have also co-operated earnestly in the development of this work. More recently the assistance of the medical staffs of the other sanatoria under the control of this Department has been utilized and during the past year physicians in charge of certain of the county and municipal tuberculosis institutions as well have actively participated in the work. The staffs of the various tuberculosis associations affiliated with the State Tuberculosis Association have also given invaluable and rapidly increasing assistance to it.

Hitherto all such work has been carried out on a demonstrative and experimental basis, but as a result of these activities carried out on a very limited scale a program has gradually been evolved to be worked out on a State-wide scale and over a relatively long-time basis—a period of ten years. This project has been explained in considerable detail to the members of the Commission on Administration and to the Legislative Committee on State Administration, which was charged in 1923 with the duty of investigating as a recess committee the tuberculosis hospitalization problem and reporting to the Legislature the best policy to be followed in reference thereto. After thoroughly studying the proposition, both of these bodies have given it their hearty support. In much less detailed fashion, but in broad outline, the proposed program has also been called to the attention of His Excellency, the Governor, and the presiding officers of the two branches of the Legislature, as well as to many individual members of the General Court. From all of these gentlemen encouraging endorsement of the program has been received.

The advice and constructive criticism of the medical profession generally and of tuberculosis specialists particularly have been sought in reference to the proposed program. Nearly all of those to whom the proposition has been clearly explained have endorsed it as feasible, although many practical difficulties have been pointed out. It is obvious that the difficulties will be great, particularly because the work is as yet so little understood by the general public, and still more because of the fact that the medical profession has not been trained to detect incipient juvenile tuberculosis. However, the concensus of opinion is that the plan is both feasible and economical.

The probabilities of wholesale reduction of the burden now imposed by tuberculosis through the carrying out of the plan proposed seem great. Therefore, there has been filed with the Governor an itemized budget for such a tuberculosis-

prevention campaign, based upon a ten-year plan of operation, aggregating for the whole period of time nearly half a million dollars and providing for the examination of 200,000 school children enrolled in the earlier grades of school for the purpose of forestalling or detecting tuberculosis in its earliest stages. In the initial year's operation approximately 10 per cent of the total estimated cost will be necessary.

A program of such magnitude must depend for its success upon the complete understanding by the medical and nursing professions and by the health and school authorities of the details of the proposal and upon the enlistment of their hearty co-operation in carrying out the plan, together with a sufficient although much less detailed comprehension of the plan on the part of the parents throughout the State, so that their interest and co-operation will also be assured.

It seems fitting at this time to make a brief statement of the reasons underlying our recommendations.

This new program proposes to put into effect on a broad, State-wide scale, the knowledge gained during the last twenty years as the result of continuous study, and now universally accepted by the medical profession, as to the period of life in which tuberculosis usually first gains a firm foothold. When the present anti-tuberculosis program was being developed in this country, the greatest emphasis was naturally placed upon the obvious fact that consumption of the familiar type everywhere recognized was essentially a disease of adolescence and young adults. Hence, all the machinery for combating tuberculosis was directed against the prevention of adult infection and towards the provision of adequate hospital, dispensary, and home treatment of adult consumptives. But it has been conclusively shown in the last twenty years by the research of hundreds of workers the world over that there exist three distinct general types of the disease tuberculosis when the disease is considered in relation to definite periods of human life. The first or the so-called infantile type of the disease found under two years of age is practically always in the nature of a general infection throughout the body and practically always fatal. The next type, the so-called juvenile type, found usually between 5 and 12 years of age, is the type or stage of the disease which shows a very low fatality. During this age period the disease is essentially one of the lymphatic glands and in the vast majority of cases is confined exclusively to these glands. The third and last is the adult type of tuberculosis. Here the disease has spread beyond the lymph glands and may attack any organ of the body and is most conspicuously found in the lungs, producing the familiar type known as consumption.

It is not to be understood that these age classifications are absolutely rigid. Any type of the disease may be found in any age period but general tuberculosis in adults is unusual and a tuberculous process in an infant confined to the lungs alone is also very rare. Hence, for practical purposes the division just now roughly made fits the facts closely enough for proper procedure to be founded upon it.

When the whole question of human susceptibility to the tubercle bacillus is considered, it appears that the knowledge gained during the last two decades in reference to this subject has been of a two-fold character: first, that while exposure to tuberculous infection relatively early in life is almost universal, nevertheless out of the entire population almost three-fourths of all individuals seem to develop sufficient immunity to the tubercle bacillus to render them thereafter unsusceptible to the disease; and second, that the really "incipient" stage of tuberculosis is not what was formerly so designated in the first incomplete knowledge of the evolution of human tuberculosis, i.e., those adult cases of consumption which show only a small area of lung involvement. Today it is believed that whenever the disease has progressed to the point where it can be demonstrated in the lungs of an adult that that very fact shows that the disease is no longer incipient. Everyone, physician and public alike, needs to get the new viewpoint in reference to this matter. It must be realized that tuberculosis in its true incipient or beginning stage is a disease of the lymphatic glands.

Fortunately, this period of what may be designated as the gland stage of tuberculosis represents the golden opportunity to overcome the disease if its real nature is apprehended and proper hygienic and hospital treatment instituted. This childhood period is the time in life when the powers of resistance can be most

easily built up and when the tendency for tuberculosis to spread to other tissues is slightest. This age period is from 5 to 12 years.

Certain other facts essential to an understanding of the program now seem sufficiently well established to justify a certain amount of dogmatic statement based on established premises. These broad, general conclusions may be stated as follows:

A. Despite the splendid fight against the spread of the tubercle bacillus, tuberculosis invasion of the human body during early years of life is still almost universal and inescapable.

B. The factors that determine whether the infection is to produce disease or not are:

1. The existence in the individual affected of varying degrees of immunity.
2. The frequency, size, and virulence of the invading "dosage" of the tubercle bacilli.

C. The importance of cutting down the size and frequency of the dosage cannot be overstated. The greatest value of the whole tuberculosis campaign hitherto, from whatever standpoint it is considered, whether the campaign for protection of milk against bovine tubercle bacilli or human isolation measures or hygienic teaching of the best habits for the consumptive, has been due to the fact that these measures have all been in the nature of lessening the amount of infection.

D. Of those who escape the disease although exposed to the universal infection, the largest number by far do so by virtue of the process called immunity. About 70 per cent of the total population in this State can reasonably be classified as belonging to this group.

E. With the other 30 per cent of the whole population who do not possess this immunity, the prospect of many increasing their resistance sufficiently to prevent serious disease is still very bright. So far as it can now be determined, this result is directly in proportion to the extent to which repeated infections can be reduced or avoided and the extent to which the powers of bodily resistance to the tubercle bacilli can be increased during the all-important period of early childhood.

F. The measures which the experience of the staff of this Department at the children's sanatorium at Westfield and which other workers have found successful in increasing resistance, once the problem of avoiding or greatly reducing re-infection has been disposed of, are very simple. They are essentially these: the maximum of fresh air and sunshine; careful regulation of the physical activities of the child; ample hours of sleep during the night, supplemented by carefully supervised naps or rest periods during the day; and most important of all, a thorough building up of the child's general nutrition.

Hence the practical proposition as a matter of proposed State policy is this:

Tuberculosis in adults is a very serious disease; it is very expensive for the patient, family, community and State, and although it is steadily and rapidly diminishing, it remains a very fatal disease, ranking among the chief causes of death.

Tuberculosis in adults represents in many instances at least an extension of a previously existing tuberculous process in childhood of a radically different type.

This glandular or childhood type of the disease is relatively easy to control. The evidence indicates that the later development of adult-pulmonary tuberculosis in these cases can be prevented if the childhood stage is recognized and appropriate treatment carried out before the lungs are actually involved.

The practical questions in reference to procedure are these:

Can the existence of this glandular or "hilum" type of tuberculosis occurring in childhood be recognized with a sufficient degree of accuracy to make it possible to select these children from the general mass of the childhood population?

Can these physical examinations be carried out on a widespread scale at a cost basis that will justify the State in making such an attempt?

I have become convinced as a result of the increasing experience of the Department in this field that the answer to both of these questions is most emphatically, "Yes!"

A brief history of the activities already carried out by the Department is pertinent here. Dr. Chadwick, as the result of his observations of children at the Westfield State Sanatorium, conceived the idea that it might be possible to detect

cases of "hilum" tuberculosis by physical examination before symptoms were sufficiently obvious to lead the parents to consult their family physician. Being at this time impressed by the prevailing, although not universal, tendency of the children admitted to the institution to fall below the average standards of development and nutrition, he proposed to the superintendent of the Westfield public schools that a thorough examination for the presence of "hilum" tuberculosis be made of a group of school children falling markedly below the average standards of weight and height, together with the group of children known to have been directly exposed to pulmonary tuberculosis in their homes. This work was carried out very thoroughly. Interesting and, when looked at from all angles, highly encouraging results came from this study. But fearing lest erroneous conclusions might be drawn if too much stress was placed on the findings in a single community, this Department through its field force of physicians and nurses and the staffs of the sanatoria, later assisted greatly by staffs of other institutions, has for the last three years carried out a series of similar examinations all over the length and breadth of Massachusetts. In all, some 89 communities have been studied in this manner and a total of 126 clinics held at which five thousand school children have been examined.

To recapitulate, this work, carried on throughout the State for the past three years, has been directed to the examination of certain selected groups of school children:

A. Children who were 10 per cent or more below the accepted standard of height and weight for age.

B. Contact cases — those who were known to have been exposed to tuberculosis in their homes.

C. A much smaller group not coming under either of the above classifications but whose physical condition was considered unsatisfactory by the teachers or family physician.

As a result of these examinations, the following conclusions can be drawn:

The evidence shows that 15 per cent of the children in the schools of Massachusetts between the ages of 5 and 12 years will be found to come within one of the three groups just mentioned. There will be some variations in this percentage in different communities but the average will be closely maintained in different sections of the State. Applying these figures to the total school enrollment in this age group gives in round numbers *at the present time* 110,000 school children who need to be examined, diagnosed, classified, and appropriate treatment instituted for the benefit of those found to be in need of it.

The next significant point is that when this group is thoroughly examined by sanatorium physicians expert in the difficult field of detecting "hilum" or juvenile tuberculosis, and when the doubtful cases are checked by subsequent X-ray examination of the chest, and in some instances by the tuberculin test as well, it will be found based on past experience that about 8 per cent of this group will show signs and symptoms sufficient to justify a positive diagnosis of "hilum" tuberculosis. Every one in this Department today is, I believe, thoroughly convinced that this same group if neglected will furnish the great bulk of adult consumptives 10 or 15 years hence, and on the other hand that a very high percentage of all these children can be speedily and permanently cured if adequately treated while yet in the glandular stage of the disease.

This would indicate that there are approximately 8,500 to 9,000 children enrolled in the schools of Massachusetts, not as yet diagnosed by any one as suffering from the juvenile type of tuberculosis, who ought to be found, placed under good hygienic conditions, and their nutrition improved before they reach the critical age of adolescence. That is the time when the disease if unchecked will assume the much more serious and fatal adult form.

For various reasons which it is not necessary to state in detail here, it is also probable that only about 1 per cent of the total group selected out of the whole school population for special examination needs to be considered as prospective candidates for sanatorium treatment. If this conclusion is correct, undoubtedly there are not beds enough at the present time in the various State sanatoria to provide for all the children needing prolonged sanatorium care, yet not a large number of new beds is needed, it being assumed that there will be a continuous increase in

the number of existing beds available because of the decreasing demand in the coming years for the care of adult cases. It is also obvious that bed provision for children will be very greatly increased by the provisions already made by some of the larger municipalities, notably Boston and New Bedford. It seems quite clear, however, that aside from the largest municipalities the most practicable way of furnishing sanatorium care to this group of children is through the State, because these children in a great majority of cases can soon be put in such physical condition that they will actually benefit by a short, regular school period each day, and there would not be a sufficiently large group in most of the local institutions to justify the maintenance of a complete school system.

There will also be found, based on the experience of this Department thus far, a much larger group, approximately 27 per cent of the total group selected for examination, who will have to be classified as either "suspicious" of beginning "hilum" tuberculosis or as showing such a marked deviation from normal nutrition and physique for their age that they should be under special supervision and attention. This group plus the considerable number of children who will be found and definitely diagnosed as suffering from active "hilum" tuberculosis, but whose general condition, home surroundings, prospects for intelligent home care and supervision of nutrition, are so good that they do not need special sanatorium care, represents a problem of treatment for which the responsibility must be left to the individual families and communities.

The following statements summarize the proper disposition of positive and "suspicious" cases found in clinics:

The "positive sputum" cases and all others which exhibit pronounced signs and symptoms of active disease should have sanatorium care. The group to be supervised without hospitalization will consist of the other cases where a positive diagnosis has been made based on signs and symptoms showing the latent and more chronic type of disease. These children will do well under home treatment provided home conditions are fairly good and the parents intelligent and co-operative. There must also be considered the much larger group of cases that can only be termed suspicious but which must have the same type of supervision. The children in this category are borderline cases where a definite diagnosis is not justified but who are destined in many instances to become definitely tuberculous if help is not promptly given. Ninety-five per cent of them are infected with tuberculosis and in their state of malnutrition will become easy prey to the disease. This group of children must be followed up and taught correct health habits, good hygiene, and later be periodically re-examined. Even under this régime, a small number of these cases will be found to have made no improvement and they should be sent to a sanatorium.

The following statement is a reasonable forecast of the results that may be obtained by carrying out the program outlined above:

1. Cases of active and latent tuberculosis will be discovered at an early stage and treatment instituted at a time most favorable for arrest and cure of the disease.
2. The number of cases of malnutrition will be greatly reduced and by doing this the susceptibility of such children to tuberculosis and other infectious diseases will be lessened to a marked degree.
3. The clinics will lead to the discovery of other physical defects that impair health and thus give opportunity for the correction of such defects.
4. Because of a higher standard of health there will be a substantial decline in the number of retarded children that now have to repeat their grades in school.
5. Mortality from tuberculosis will decline rapidly because by this program cases of tuberculosis will be prevented from developing into bacilli spreaders and infection thereby lessened, and at the same time the resistance in the whole group of school children will be so increased that when they reach adolescence and young adult life they are much less apt to develop the pulmonary type of the disease.

The means at hand for attacking the problem:

Money is the first requisite but money is far from solving the problem of creating an efficient organization to grapple with the situation.

The most difficult problem of all is that of collecting a personnel sufficiently trained in the work of diagnosing "hilum" tuberculosis. Diagnosis is not easy and the subject has been singularly neglected both by the pediatricist and the tuber-

culosis specialist whose work is practically all confined to adult manifestations of the disease.

It is largely on account of the need of developing and training such an expert force that a progressive plan of action is recommended by which the maximum number of diagnosticians required will not be reached until the third year of the program.

There are now available for this work, for a portion of their time only, however, the medical staffs of the sanatoria and the State Infirmiry, the medical staffs of the county sanatoria, and of a few municipal institutions provided with resident, full-time medical officers. There is also available to a variable but everywhere limited extent the expert assistance of the municipal tuberculosis dispensary physicians.

There are available in addition for a part of their time the services of the seven district health officers and nursing staff of the department and of the tuberculosis nurses of the various municipalities. Inasmuch as these nurses must also keep under supervision several thousands of adult consumptives, the time which they can give to the special examination work is of necessity limited.

The field nursing force of many of the tuberculosis associations are available for assistance in the program, some of them on practically a full-time basis. The co-operation of these workers, already actively enlisted, is the equivalent of a considerable appropriation for additional personnel from State or counties or municipalities.

Other agencies available and whose co-operation is necessary for the success of the project are:

1. The family physician, to whom all positive and suspicious cases should be referred.

2. The local boards of health with their dispensary and nursing staffs.

3. The school departments, with their physicians, nurses and nutritionists.

4. Summer camps and preventoria supported by municipalities and neighborhood agencies.

5. Another valuable adjunct is the teaching of health and health habits, particularly nutrition, in the schools, not as an added course of study but by incorporating health and hygiene into the daily lessons of reading, writing and arithmetic. This has been done for six years in the schools of Newton with most excellent results and the same idea is developed by the well-known National Health Crusade movement.

The immediate personnel additions which the program calls for are five full-time physicians, one to serve as general supervisor and director of the entire program immediately under the Director of the Tuberculosis Division of the Department.

It is proposed to expand this staff to a maximum of twelve by the third year in order to provide adequate machinery for examination of all the children in this age-period considered; thereafter to reduce the number of personnel as only children of the first grades plus re-examinations will need to be covered.

The program also calls for a staff of nurses, eight in number for the first year, who will devote their entire time to the work, and for four nutrition experts for the first year whose duties will be the instruction of mothers as to nutrition of the group of "suspects" and "positives" not going to sanatoria.

An additional clerical force will also be required.

The services of county and local sanatoria staffs, of municipal tuberculosis dispensary physicians and nurses, local board of health staffs, both medical and nursing, and of school physicians and nurses can all be counted upon to a considerable extent in the examination program, but it is perhaps wise to emphasize that not too much should be asked, for the most essential feature of the success of this plan is our reliance upon the local officials, workers, city governments, and local tuberculosis and other child-welfare organizations, assuming the responsibility for the great problem of local special care at home or in the community. About 200,000 children will have been examined if the program is carried out over a ten-year period. About 2,000, possibly 3,000 or even more, will have had the benefit of sanatorium treatment in that time. But at all events, a much larger group of "positives" and practically all the "suspicious" and those found

seriously undernourished but without definite tuberculous indications must depend for special care upon the general community, government, child welfare agencies, parents and school authorities. This number may be variously estimated as ranging from 8,000 to 10,000 needing definite anti-tuberculosis or tuberculosis-prevention care as exemplified by the measures elsewhere outlined, up to possibly continuously 15,000 to 25,000 others needing less intensive care, principally home advice to mothers relative to nutrition supplemented by instruction in hygiene in the schools.

SOME COMMENTS ON THE REPORT OF THE LEGISLATIVE COMMITTEE ON STATE
ADMINISTRATION ON THE TUBERCULOSIS HOSPITAL POLICY
OF THE COMMONWEALTH.

The Legislature acted on the special report made to it by this Department upon the institutional treatment of tuberculosis by referring the matter to the Committee on State Administration, which served as a recess committee to consider this subject during the past summer and which has now filed its report upon the tuberculosis hospital situation. I shall not go into detail here upon the recommendations made by the Recess Committee but I will now call to your attention the most salient points of the report:

Of special interest is the recommendation of this Recess Committee that sufficient funds be appropriated to enable this Department to carry out its program for the extension of special clinics for school children for the purpose of controlling and preventing tuberculosis.

The Recess Committee did not adopt the recommendation contained in the report of the Department to the Legislature of 1922 that the children be transferred from the Westfield Sanatorium to Rutland but recommended instead that Westfield be retained as a children's institution; that at the North Reading Sanatorium wards be gradually made available for the care and treatment of children; and that Rutland be retained as an institution for adults. The committee, however, seconded the recommendation of the Department that the Lakeville Sanatorium be set aside for the care of persons suffering from non-pulmonary types of tuberculosis. It also recommends that the rate of board at the institution be increased from the present maximum of \$4 to \$7 per week.

In addition to the recommendations immediately affecting the sanatoria, the Legislative Recess Committee makes several far-reaching recommendations in reference to tuberculosis policy. Perhaps the most significant of these is the recommendation that in the case of cities maintaining separate tuberculosis hospitals the subsidy now payable by the State for the care of patients in such institutions shall hereafter be paid only after the Department of Public Health has certified that these hospitals have conformed to certain definite standards concerning modern tuberculosis hospital treatment. Under the standards outlined, several of the now existing municipal tuberculosis hospitals or wards could not qualify for subsidy except by very radical changes in organization and procedure.

The report of this body further recommends that the law which now requires every town of 10,000 inhabitants or more to maintain a tuberculosis dispensary be amended to require the furnishing of such facilities only in the case of municipalities of 50,000 population or over, and for communities of less than 50,000 population only upon the request of the Department of Public Health. This is a proposal to recognize in law what has long been the case in fact, — that until large units of population are reached a mere classification by population will not clearly indicate the communities where tuberculosis dispensary facilities need to be maintained. The recommendation has also been made that if any municipality fails for three years to establish and maintain a tuberculosis hospital, in accordance with the standards recommended as requisite for subsidy, it shall then be made part of the tuberculosis hospital district in the county in which such city or town is situated. It is also recommended that any city or town may of its own volition cease to maintain a separate tuberculosis hospital and join a county tuberculosis hospital district.

While perhaps not the usual thing in formal reports of Departments, it may not be amiss to express a note of appreciation in behalf of this Department of the earnest, sincere manner in which the Committee on State Administration carried

out its arduous duties in the matter of studying this intricate problem of tuberculosis care. The members of the Committee threw themselves into this work with enthusiasm. They visited in person practically every institution caring for tuberculous people in the Commonwealth and the Committee as a whole and through its sub-committees put a great deal of hard work into the preparation of its report as finally submitted to the Legislature.

THE TUBERCULOSIS SANATORIA.

The record of the past year for the sanatoria has been for the most part exceedingly satisfactory. With one exception the institutions have been filled to capacity practically the whole year and waiting lists have at times been uncomfortably long. The most noticeable feature of the year's work and the one deserving greatest commendation is the remarkable interest shown by the staffs of our institutions in promoting the program for the examination of children for the prevention of juvenile tuberculosis. Without exception the members of our staffs (and to this must also be added the staffs of the State Infirmary at Tewksbury and certain of the County Sanatoria, particularly the institutions of Barnstable County, Hampshire County, and Essex County) have labored hard to meet as far as possible the requests filed with the Department for such examination clinics.

The past year has seen a continuance of the chronic problem of retaining and employing satisfactory medical staffs for the State institutions. At the present time there are two vacancies in the medical staffs and this problem is becoming if possible increasingly difficult. In common with the experience of other State institutions, there has been considerable difficulty in obtaining an adequate supply of employees for the less skilled positions.

No new building operations of any magnitude have been carried out during the past year at the State sanatoria. Because of the increasing difficulty of obtaining common labor, farm operations have been very markedly curtailed.

One achievement has been carried out for which the Department may feel deeply grateful and that is the replacement of the dairy herd at Westfield, found to be markedly affected by tuberculosis, by an entire new herd purchased out of herds accredited by the Federal Department of Agriculture as being entirely free from tuberculosis. With this change made we may report that the state of health of our dairy herds as far as tuberculosis is concerned is now almost ideal. The Rutland herd has already passed successfully the preliminary tests for admission as an accredited herd and in all probability in a short time will become one of the first if not the first accredited herd maintained by a State institution in this Commonwealth. At Lakeville, where the difficult project of rearing a young non-affected herd from an old infected herd has been carried out for several years past, our goal is now clearly in sight. The few remaining old cows have been removed from the dairy barn and after the necessary process of renovation and disinfection has been carried out, the young healthy herd can be transferred into the barn and it will probably be but a relatively short time when this herd can also be added to the list of accredited herds.

CELEBRATION OF THE 25TH ANNIVERSARY OF THE ESTABLISHMENT OF THE RUTLAND STATE SANATORIUM.

The State Sanatorium at Rutland under the supervision of this Department has the distinction of being the first institution of the kind ever established by any state in this country. This past year marked the 25th anniversary of the opening of this institution. Because of the remarkable development of tuberculosis sanatoria since 1898 in the United States, it was deemed by this Department fitting and appropriate to mark this anniversary with special exercises. The annual Tuberculosis Conference of the New England Tuberculosis Associations was held in the neighboring city of Worcester just prior to the celebration of the anniversary at Rutland and it was possible to combine the two meetings in a very happy fashion.

The program for the New England Tuberculosis Conference on the last day of its meeting was held at the sanatorium, followed immediately by simple but extremely interesting exercises commemorating the 25th anniversary of the establishment of the Rutland Sanatorium. Very brief addresses were made by repre-

sentatives of the various branches of State Government and of the former boards of trustees. The two principal addresses of the occasion were given by Dr. Vincent Bowditch who was one of the first attending physicians of the institution and who has always followed its progress with most intense interest and concern. Dr. Bowditch spoke most entertainingly upon the circumstances which resulted in Massachusetts' taking the momentous step of establishing an institution for the cure of tuberculosis and paid a most fitting tribute to the public spirit of those interested in the early days of the establishment.

The other principal address was delivered by Dr. Harry Lee Barnes, Superintendent of the Rhode Island State Sanatorium, who spoke upon the topic of the influence of Rutland Sanatorium upon the tuberculosis movement throughout the United States, and presented in a most convincing fashion an argument as to the value of the sanatorium idea and sanatorium treatment.

There was a total attendance of about 500 at the celebration.

PROGRESS OF THE DIPHTHERIA PREVENTION CAMPAIGN.

Next to the activities of the program against tuberculosis, the most far-reaching and most arduous undertaking of this Department in the field of communicable disease control is the development of the campaign to prevent diphtheria. It has been pointed out repeatedly that for the past fifteen years at least diphtheria has tended to remain at a relatively high constant level of prevalence and fatality despite the universal availability of antitoxin and the assistance given by the various health departmental laboratories for the diagnosis of this condition. In recent annual reports, the practicability of active immunization against diphtheria has been discussed in considerable detail and it is not necessary again to expound the basis upon which our present program stands. It is sufficient to say that during the past year popular interest in the so-called Schick test and in active immunization against diphtheria by "toxin-antitoxin" has grown with amazing rapidity throughout the State. It is a very striking commentary upon the efficiency of the procedure (although only what should be expected) to note the sharp decline in diphtheria incidence and deaths apparent in certain cities and towns where active immunization has been extensively carried out compared with the communities where no special activity along these lines has been instituted. The temptation to state here the experiences of several cities and towns is very strong but would lead to much further detail than is advisable at this place. The story will be given in full in the report of the Communicable Disease Division.

The demand at the present time for administration of the Schick test and "toxin-antitoxin" among children is almost beyond the capacity of the Department to handle. During the past year demonstrations were held in many communities, 98 in all, and at the present time a large group of communities is awaiting an opportunity to have such a program instituted. The interest in it is perhaps most accurately reflected by the figures showing the distribution of "toxin-antitoxin" preventive mixture. This began in 1919 on an experimental basis with less than 2,000 doses distributed. In 1920 approximately 3,500 doses were distributed, in 1921 a little less than 10,000, in 1922 approximately 95,000, and in 1923 over 175,000 doses. It now seems reasonable to predict that in a few years' time diphtheria will be very sharply checked and its fatality markedly reduced as the medical profession, the public, and school authorities gradually learn to understand more fully the possibility of diphtheria control by these efficacious and satisfactory methods.

THE MATERNAL AND INFANT HYGIENE PROGRAM.

In the last annual report reference was made to the general program adopted by this Department for forwarding the work in the fields of maternal and infant hygiene. The program of the Department in this field for the past year has been devoted to two principal projects: first, a detailed intensive study by the special medical personnel employed for that purpose into all the circumstances of deaths of mothers during childbirth. It has not been considered practical to study records of this sort over a long period of years, partly because of the physical impossibility of reaching so many individual cases with the limited personnel available and particularly because of the rapidity with which important and essential

facts are lost sight of following the death of a mother. Therefore, the goal fixed for this year's work was the careful investigation of each individual case of maternal death during the years 1922 and 1923 with the plan, of course, to carry out similar investigations concurrently for future years for as long as such investigations seemed profitable.

As nearly as could be determined, there were 1,270 maternal deaths for the years 1922 and 1923. The field staff employed for this purpose has now reached and made a complete survey of all of the circumstances of death in childbirth in 1,028 cases out of this total. Shortly after the beginning of this next calendar year, when the receipts of the last death returns of 1923 are received, the study will be completed for the two-year period. At the same time, analysis is being made of these figures and some very interesting points noted. It is perhaps well to indicate again that the Department does not propose to bring in any specific recommendations as to new procedure in this difficult subject of prevention of maternal mortality until the facts now being collected are completely analyzed and studied in order to determine which of the features producing these deaths are controllable by medical or public health measures.

The study of infant deaths is being carried out along the same lines as has been done in the study of the deaths of mothers although it has been found impracticable to investigate each individual infant death.

The most arduous part of the infant hygiene investigation has been the surveying within all the communities of the State of the present machinery and facilities for the conservation of infant life. The nursing field force of the Division has devoted almost all of its time to this work during the past year, surveys of 235 towns and 21 cities having been completed. This phase of the work is of necessity laborious and time-taking, but it is the only procedure which will furnish the needed sound foundation for subsequent effective activity.

As a result of the conditions discovered through these individual local surveys, communities are already beginning to see opportunities for improving their child hygiene work, and the results of this stimulation are discernible in the increasing requests made upon the nursing force and the field staff of the Department generally by the official governments of various cities and towns and organizations interested in child welfare for expert advice in matters pertaining to infant and child hygiene.

It would be unreasonable at this time to expect to demonstrate any concrete results in the reduction of the infant and maternal death rates as a result of the program just being begun in this field. I am convinced as time goes on that the attitude of the Department in this fundamentally vital matter is sound; viz., that in this State effort should be concentrated on developing a relatively small group of trained experienced workers to co-operate with city and town governments and local organizations interested in maternal and infant hygiene to the end that each local situation may be studied, its defects discovered, and such methods and measures introduced as will gradually reduce to its lowest minimum the loss of lives of mothers and infants, rather than to put in the field nurses and physicians to do actual house to house or case to case work. In other words, the policy of the Department in this work is one of stimulation and co-operation by persons well fitted for this work, leaving to each individual community the responsibility for the inauguration and successful carrying out of a comprehensive child hygiene program.

SOME OUTSTANDING EDUCATIONAL ACTIVITIES.

In addition to the health education program of the Department which will be discussed in the brief résumé of the activities of the Division of Hygiene, certain educational features of the past year have been of sufficiently unusual significance in occurrence or so striking in character as to deserve special comment. First among these was the meeting of the American Public Health Association held in Boston in October of this year. This organization comprises in its membership all the leaders and practically all of the technically trained workers in public health endeavor in the whole continent, including official public health work, university work, industrial hygiene or laboratory activities, and through its annual meetings presents exceptional opportunities for general education in public health for the

communities in the vicinity of which it meets. The meeting held this year was of the usual high order of excellence. Thoughtful papers were presented followed by active discussion participated in by recognized leaders in public health activity in every department of health work. The opportunity opened to the health officials and others interested in health work in New England to take part in this meeting was generally utilized. Reporting by the daily press was unusually good and much intelligent interest was exhibited by the general public as to the proceedings of this important meeting.

Simultaneously with the meeting of the American Public Health Association was held the "Boston Health Show." This Department, the Boston Health Department, and over one hundred other agencies, both governmental and non-governmental, interested in public health in the city of Boston combined, under the management of the National Health Shows, Inc., in presenting for the first time in this section of the country a large exposition or health show. This took place in Mechanics Building, Boston, was very largely attended, and resulted in much stimulation of public interest in matters affecting health. Many of the exhibits were of extraordinary merit and could not fail to produce deep and lasting impressions. Exhibits were arranged according to the type of health activity that was being demonstrated instead of having each organization or department making a complete but diverse exhibit of all its activities; for example, everything pertaining to child hygiene was grouped in one portion of the exhibit and in a similar way everything pertaining to communicable diseases or to general sanitation was grouped together.

In connection with the Health Show a most excellent pageant was presented, symbolizing the progress of the idea of good health through the ages and also featuring some of the more outstanding achievements in medical progress and in health advancement which have taken place in Boston since the earliest colonial days.

Another feature of especial interest during the past year was the opportunity given to the Department to welcome a group of distinguished foreign health officers visiting this country under the auspices of the Health Section of the League of Nations. These gentlemen spent three weeks within this State devoting one week to the study of the work of this Department, another to that of the Boston Department of Health, and the third week to the health activities of the city of New Bedford, with a population of approximately 100,000, this city being chosen as representative of the best type of municipal health work being carried out by a city of its class.

THE SPRINGFIELD HEALTH CONFERENCE.

Still another event of great public health educational interest during the year and a rather unique one was the conference at Springfield in April held jointly by all voluntary organizations operating on a State-wide scale and exclusively or largely interested in health promotion. In all, sixteen organizations participated: The Massachusetts Association for Occupational Therapy, Massachusetts Dental Society, Massachusetts Dental Hygiene Council, Massachusetts Association of Directors of Public Health Nursing Organizations, Massachusetts State Nurses Association, Public Health Committee of the Massachusetts Medical Society, Massachusetts Society for Social Hygiene, New England Division of the American Red Cross, Massachusetts Tuberculosis League, Massachusetts Society for Mental Hygiene, Massachusetts State Federation of Women's Clubs, Massachusetts Parent-Teacher Association, Boston Association for the Prevention and Relief of Heart Disease, Massachusetts Committee of the American Society for the Control of Cancer, Massachusetts Association of Boards of Health, Massachusetts Department of Public Health.

A well-planned and comprehensive program was arranged and carried out with the active co-operation of all the participating organizations.

Great interest was aroused and much lasting benefit to the work of all these organizations undoubtedly resulted from this meeting. In all probability, similar conferences will hereafter be carried on as a regular annual procedure.

THE ANTHRACITE COAL SITUATION.

As a result of the anthracite coal strike in the latter part of the year 1922 this Commonwealth experienced a very serious shortage of coal for household use dur-

ing the past winter. As a result of the coal scarcity and the willingness on the part of people to pay almost any price for it, coal of a very inferior grade appeared on the market. Complaints were received from all quarters and after conferences with the Special Fuel Administrator, the Department of the Attorney-General and the Bureau of Standards, this Department offered to carry out analyses to determine the chemical nature of some of these lots of coal concerning which complaint was made by purchasers. Very astonishing percentages of non-inflammable refuse, slate and slag were found among the samples submitted and the term "fire-proof coal" soon came into common use.

Inasmuch as it appeared that under existing laws the situation could not be relieved, legislation was introduced and passed which prohibited the offering for sale of anthracite coal not fit for ordinary consumption. Upon this Department was placed the responsibility of establishing standards as to what should be considered allowable as to impurities or non-inflammable ingredients in commercial coal. Somewhat drastic provision was also made in the same law providing that lots of coal found to be unfit for domestic use should be seized by the Department and confiscated. There was aggressive opposition to the enactment of this measure from certain quarters, and predictions were freely made that as a result of this legislation Massachusetts would be boycotted by shippers of anthracite coal. These consequences do not seem to have followed and it is a conservative conclusion that the public has been definitely benefited and protected by this legislation. Its carrying out has, of course, resulted in considerable increase in the volume of work for the Laboratory of the Division of Food and Drugs, which has been making these determinations, and for the office of the Attorney-General and the several District Attorneys.

PERSONNEL.

The personnel changes for the year passed have been less numerous than for several previous years. Of most importance was the resignation of Dr. Bernard W. Carey, Director of the Division of Communicable Diseases and Deputy Commissioner of the Department. Dr. Carey resigned his position with this Department to accept an appointment with the American Child Health Association in Georgia where he will have charge of a demonstration unit at a salary materially higher than that paid by the Commonwealth. Dr. Carey had served the Department since 1918. He was first Epidemiologist and later Director of the Division of Communicable Diseases. Subsequently he served as Deputy Commissioner in addition to his duties as Director of the Division of Communicable Diseases. He came to the Department after having had five years' experience in municipal health work as Chairman and Executive Officer of the Board of Health of the city of Fitchburg. His work has been of a uniformly high character, and the severing of his connection with the Department was met with the universal regret of all his associates. The vacancy caused by Dr. Carey's resignation has been filled by the appointment of Dr. George H. Bigelow as Director of the Division of Communicable Diseases. Dr. Bigelow on two previous occasions has served with the Department as Epidemiologist. In addition to holding an academic and medical degree, he holds the degree of Doctor of Public Health from Harvard University. He served with distinction during the late war and since that time has held two responsible executive positions with educational institutions.

Another important personnel change during the year has been the addition to the Division of Food and Drugs of the laboratory personnel formerly employed under the Department of Mental Diseases, taken over for the purpose of analyzing and testing the quality of foodstuffs and other materials supplied the State institutions. This organization consists of a group of analysts under the leadership of Dr. Fred F. Flanders, a well-known chemist in the field of food-analysis.

It is with great regret that I have to call to your attention the loss of a member of the staff of the Department who died on Oct. 19, 1923, while on duty and whose services to the Commonwealth have been of unusual merit and of unusual length. I refer to the late Harry I. Guilford who, ever since the establishment of the Antitoxin and Vaccine Laboratory at Forest Hills, had served as the curator of the stables, who developed a very remarkable skill in the technique of handling animals in connection with the work of the Biologic Laboratories, and who had always

been an indefatigable worker and one filled with enthusiasm about the importance of the work with which he was connected. In his death the Commonwealth sustains a great loss.

At the very close of the last fiscal year occurred the death of Mr. Charles J. O'Brien, Chairman of the State Board of Examiners of Plumbers. The fact of his death was noted in the last annual report.

Mr. Frank L. Avery of Holyoke, Chief Plumbing Inspector of the Holyoke Board of Health, was appointed on January 7, 1923, to fill the balance of the unexpired term caused by the death of Mr. O'Brien, and on Nov. 20, 1923, Mr. Avery was reappointed to the Board for the full term of three years.

On Dec. 22, 1922, Mr. Charles Felton, who has served as a member of the State Board of Examiners of Plumbers since 1909, was reappointed for a term of three years.

On Aug. 15, 1923, Dr. Elliot A. Robinson was appointed as Assistant Director of the Antitoxin and Vaccine Laboratory, Division of Biologic Laboratories, vice Dr. Robert N. Nye, who resigned to accept a position as Assistant Director of the Thorndike Memorial Laboratory of the Boston City Hospital.

SPECIAL LEGISLATIVE REPORTS AND LEGISLATION RECOMMENDED.

In accordance with the following resolves of 1923, reports will be submitted by the Department to the Legislature of 1924:

Chapter 6. Resolve Providing for a Continuation of the Investigation as to the Advisability of Standardizing Municipal Regulations Relative to Plumbing and Drainage.

Chapter 49. Resolve Providing for an Investigation by the Department of Public Health of the matter of Sewerage and Sewage Disposal in the Valley of the Merrimack River.

Chapter 64. Resolve Providing for an Investigation by the Department of Public Health of Sewerage and Sewage Disposal for the Cities of Salem, Beverly and Peabody, the Town of Danvers, and for Certain Public Institutions.

Passage of the following legislation is recommended by the Department:

1. An act amending Section 209 of Chapter 94 of the General Laws, relative to the possession of hypodermic syringes, hypodermic needles, etc.
2. An act for clean, sanitary and healthful food establishments.
3. An act amending Section 191 of Chapter 94 of the General Laws, providing a penalty for misbranding foods.
4. An act amending Section 131 of Chapter 94 of the General Laws, relative to the carcasses of neat cattle, sheep or swine slaughtered outside the Commonwealth.

DIVISION OF ADMINISTRATION.

During the past few years very brief reference has been made to the work of the Division of Administration in the annual reports. When the Department was reorganized in 1915 it was decided that as far as possible the activities of the Department should be placed on what may be designated as a decentralized basis. In other words, with the divisional type of organization the Director of each division was given considerable latitude as to procedure within such general policies as were adopted and in such matters as the handling of employees and the determination of financial policies subject to general procedures and budget recommendations as made by the Commissioner. The experience of the past nine years has shown that while this decentralized type of management has many excellent features, strict central control of policies and procedures is required if the full benefits of this type of organization are to be realized.

Even at the time of the reorganization of the Department it was felt that there would remain many problems of general concern to all divisions and certain procedures such as the classifying and routing of correspondence, handling of accounting, records of personnel, and permanent filing procedures which would of necessity have to be carried out directly under the central executive organization. For this purpose a Division of Administration was created operating under the Commissioner.

As the years have gone by to a certain extent new legislation has increased the

volume and type of work left to the Division of Administration. Two enactments, one the general reorganization of the State departments, which resulted in placing the administration of the State sanatoria under this Department, and the other, legislation creating the Commission on Administration and Finance, have conspicuously increased the volume of work handled through the Division of Administration. To a far greater extent the natural growth of the Department itself has also resulted in much larger volume of work going through the Division of Administration until it is now probably a very conservative estimate to say that the work of this Division has increased at least threefold in the last three years, while the personnel of the Division has remained practically unchanged during this period.

By continuous devotion to their work of the small personnel attached to the Division an effectively operating system has been maintained, but it would seem as if the point has been reached where a more detailed plan for the future conduct of the work of the Administrative division of the Department is essential.

I have discussed this problem with the Commission on Administration and Finance and have received their approval of certain changes which it is planned to put into effect this coming year. In brief, the changes contemplated are to be brought about by promoting the present Secretary to the Commissioner and Public Health Council to the position of assistant director of the Division of Administration and entrusting to her the responsibility of carrying out and improving our current methods of control of personnel records, finances, and also for planning new methods for more efficient routine analysis for the work of the Division.

By this procedure it is believed that the immediate advantages of the decentralized method of administration can be retained and at the same time the methods of control of the central office can be worked out in such fashion as to keep the work of each division exactly parallel with the administrative procedure in all the other divisions, and to maintain in readily accessible form essential information pertaining to the work of the entire Department.

DIVISION OF SANITARY ENGINEERING.

The number of applications received by this Division during the year for advice with reference to water supply, drainage and sewerage has been 240, the highest for many years. Of this number 163 related to water supply, 9 to ice supply, 29 to sewerage, 9 to pollution of streams, and 30 to miscellaneous matters.¹

In addition to the work of the Division relative to these applications, much of its time has been devoted to consultations by the Chief Engineer and his principal assistants with the authorities of cities and towns and with others concerning matters relative to water supply, drainage and sewerage, and other subjects. Especially has much time been given to Committees of the Legislature and municipalities relative to questions involved in the special investigations as to the water supply of some of the larger districts in the State upon which the Department has recently made special reports. The Division has been called upon for a great amount of work during the year in connection with advice as to temporary additional water supplies made necessary by a short drouth in the summer and early autumn. This drouth, following a comparatively long period of years of high rainfall during which the growth in the consumption of water has gradually become greater in many cases than the safe capacity of the sources of water supply, resulted in serious deficiencies in many places.

The rainfall for the year up to the end of November taking the State as a whole has been somewhat greater than the normal. On the Wachusett watershed, which lies about in the geographical center of the State, the rainfall exceeded the normal in January, April, October and November and did not differ greatly from the normal in March, June and July. In the months of February, May, August and September there were marked deficiencies in rainfall, and in the months of August, September, and the first half of October the deficiency produced a short though somewhat severe drouth.

The rainfall was somewhat less than the normal for the year in the extreme eastern part of the State and in the southern part of the Connecticut Valley but was above the normal in the central and western portions. While the rainfall for

¹ There were also received some 58 applications for the examination of private wells.

the year as a whole has been about equal to the normal throughout the State, the short dry period extending from May to the middle of October produced serious shortages of water in many of the cities and towns, especially those in the neighborhood of the Metropolitan District.

The flow of the South Branch of the Nashua River at the outlet of the Wachusett Reservoir was much greater than the normal in the months of January, March, April and November. In May and October the flow differed but little from the normal while in June, July, August and September it was considerably below the normal. Nevertheless, there have been five drier seasons than this in the twenty-seven years since the measurements on the Nashua River were begun, and in most of these seasons the flow of the river was very much lower than in 1923.

The experience of this year indicates very clearly that in a long, dry period many of the municipalities in this neighborhood will have to depend for a part at least of their supplies upon the Metropolitan water system.

WATER SUPPLY OF STATE SANATORIA.

During the past year the Division has investigated the conditions affecting the water supply and fire protection at the four State Sanatoria under the administration of the Department and has advised as to certain requirements necessary to provide these institutions with adequate and effective water works systems. It has been found that the sources of water supply of the Lakeville State Sanatorium are inadequate for its requirements, and it is important that an additional supply for this institution be made available from some adequate source.

EXAMINATION OF WATER COMPANIES FOR THE ASSISTANCE OF THE DEPARTMENT OF PUBLIC UTILITIES.

In accordance with the request of the Department of Public Utilities this Division has aided the said Department under a provision of the General Laws with engineering investigations of the Onset Water Company (Wareham), White Horse Water Company (Plymouth) and the Bridgewater Water Company (Bridgewater).

DRAINAGE OF WET LANDS.

A small amount of work has been done during the year in assisting the Drainage Board in connection with plans for the drainage of wet lands and in advising as to the design of drainage works.

IMPROVEMENT OF THE NEPONSET RIVER.

A contract was made in the latter part of 1922 with the William L. Miller Company of Boston for the restoration of certain rights of way in the Fowl Meadows by the construction of certain bridges at two points where river crossings had formerly existed. Work on this contract was completed satisfactorily and accepted by the Department early in 1923.

The Commission appointed by the Supreme Judicial Court in 1921 to determine what proportions of one-half of the expense incurred of the improvement of the Neponset River, carried out under the provisions of Chapter 655 of the Acts of 1911, shall be paid by the various municipalities mentioned in the Act, has held a number of hearings and taken several views of the lands under consideration. The work of the Commission had not been completed at the end of the year.

SPECIAL INVESTIGATIONS.

Two special investigations were committed to the Department by the Legislature of 1923, one relating to sewerage and sewage disposal in the Merrimack River Valley and the other to the sewerage and sewage disposal for the cities of Salem, Beverly, Peabody and the town of Danvers and for certain public institutions. Work on these investigations has been carried on since the resolves were passed and the results will be presented in separate reports.

EXAMINATION OF SEWER OUTLETS.

The Department, through its Public Health Council, examined during the year the main sewer outlets in Boston Harbor where conditions were found to have changed but little since these works were established. An examination was also

made of the sewer outlet of the city of Lynn, where a great nuisance exists as the results of the discharge of the sewage of the city at the waterfront. Great quantities of sludge have collected upon flats adjacent to the outlet and these areas when exposed at low tide in hot weather have continued to be a source of great offense to a large population during the year.

The various sewage disposal works throughout the State have been subject to the usual oversight during the year and, where necessary, measurements of the flow of sewage have been made by the engineers of the Department. Examinations of sewage and effluent have also been made to determine the efficiency of operation of these works.

EXAMINATION OF RIVERS.

The usual examinations of the various rivers to determine their condition and the effect of the pollution which they receive have been carried on during the year. Serious complaints of the condition of some of the streams have been made, relief from which in many cases will require the installation of further works for the treatment of sewage of cities and towns and manufacturing establishments. A most serious complaint was made concerning the condition of the Aberjona River, but the complaint related chiefly to the unsightly condition of the stream in the town of Winchester, an objection for which existing laws do not appear to furnish relief.

Further serious complaint was also made of the condition of the Nashua River, which is very badly polluted by the sewage of the city of Leominster which is discharged untreated into a tributary of the stream, and of the condition of the Ware River due to pollution from various sources.

NOISOME TRADES.

The works formerly owned by the Massachusetts Oil-Refining Company at East Braintree were purchased early in the summer by the Cities Service Refining Company, which gave notice to the Department that, upon making certain changes in equipment and method of operation, it desired to begin operations on or about August 1, and the operation of the works was approved by the Department in an order dated Aug. 14, 1923. The operation of a portion of the refinery was begun in the latter part of August, and at the end of the year about 70 per cent of the plant was in operation. The operation of the works has not created objectionable conditions, and practically no complaint has been made of them during the year. Objectionable odors were caused for a short time in the vicinity of the works due to the removal of acid sludge deposits left by the old company the removal of which was advised by the Department, though it was expected that some odor would result therefrom which could not be avoided.

In connection with the matter of complaint of offensive odors in the vicinity of the refinery of the Beacon Oil Company in Everett, the Department, as a result of its investigations, advised that the character and intensity of the odors recognizable beyond the limits of the refinery were not of such an objectionable nature as to require that the further carrying on of the business of refining oil at these works should be prevented.

In response to a petition from certain citizens of Fall River and Somerset complaining of objectionable odors from the New England Oil Refining Company in Fall River the Department, after a hearing and an investigation, found that slightly oily odors escaped at times from this refinery which were not, however, found to be more objectionable than odors discharged from other furnaces in which fuel oil is burned. The Department concluded that the business of refining oil at these works can be continued without injury to the public health or comfort so long as the devices already installed for preventing the escape of odors are properly maintained and controlled.

Early in August the Department received a petition signed by a large number of inhabitants of Provincetown and Truro relative to offensive odors escaping from the plant of the East Harbor Fertilizer Company situated in Truro very close to the boundary line of the town of Provincetown. The Department examined the premises and, after a hearing on Aug. 15, 1923, ordered the company to desist from further manufacture of fertilizer and oils at these works.

DIVISION OF WATER AND SEWAGE LABORATORIES.

During the year 1923 the usual chemical, bacterial, and microscopical examinations of samples from the water supplies, rivers, etc., in the State were made, and studies of ice supplies, water filters, sewage areas, purification of sewage and trade wastes, and of shellfish and shellfish areas were also carried on. Also, practically each one of the two hundred or more applications to the Department during the year for advice upon matters relating to water supply, sewerage, sewage disposal, etc., called for laboratory work. This work necessitated the making of 8,903 chemical, 3,911 bacterial and 2,069 microscopical analyses.

Work in connection with the special investigation in regard to "Sewerage and Sewage Disposal in the Valley of the Merrimack River" caused the making of 1,614 analyses, together with studies of the trade wastes entering this river and its tributaries. Much field work has been done in connection with this investigation.

Approximately three hundred samples of sand were analyzed during the year in order to ascertain the condition of various filter areas in the State.

Special studies were carried on at the Lawrence Experiment Station in regard to the newer forms of sewage purification and much valuable work was done concerning the purification of water, especially by the new method devised at the Station several years ago. This method has attracted wide interest and is being experimented upon by the various cities in different parts of the country. It is especially adapted to the improvement of soft, highly-colored New England waters.

Work upon hydrogen ion control of different methods of water filtration was continued and as usual the efficiency of the filters supplying filtered water to the city of Lawrence was determined constantly by bacterial tests, and the operation of the liquid chlorine apparatus at these filters observed.

Much field work involving determinations of dissolved oxygen, carbonic acid, etc., was done in connection with certain river investigations and the operation of certain mechanical filter plants. Special investigations were made in regard to the effect of the effluents from such filters upon metal pipes.

Laboratory and field work for the accurate determination of noxious gases, given off from oil refineries and chemical works, was also done in connection with investigations of nuisances of this character.

During the present fiscal year a most interesting study has been made in collaboration with the Division of Industrial Medicine of the Harvard School of Public Health in reference to the question of unrecognized lead poisoning. The field work for this study was carried out by a very experienced graduate student, especially interested in Industrial Hygiene, and laboratory examinations as to the amount of lead in certain well waters which have been piped through lead pipes have been made by this Division. This called for a great many determinations of lead. The final report of the investigator is not yet available but from the results of the laboratory examinations it is obvious that the question of lead poisoning, and particularly of the type of lead poisoning produced by relatively small amounts of lead continued over long periods of time, still remains an active problem of public health administration in this State, due to the fact that lead in amounts sufficient to produce pathological results in susceptible individuals was found in a very large proportion of the samples examined.

DIVISION OF COMMUNICABLE DISEASES.

As previously stated, both the prevalence and fatality of communicable diseases as reported to the Department for the calendar year 1923 showed an increase over the previous year, there being 98,423 cases and 8,699 deaths for all diseases reported under the heading of diseases dangerous to the public health for 1923 compared with 85,734 such cases and 8,484 deaths from the same diseases for the calendar year 1922. This increase has been principally due to the very marked increase in the number of cases reported for measles, scarlet fever, and whooping cough, together with the two minor diseases of chicken pox and mumps. The diseases just mentioned, together with diphtheria, lobar pneumonia, syphilis, gonorrhea, and tuberculosis, make up the great mass of the total number of cases reported under the State laws.

There have been no epidemics of alarming proportions. Scarlet fever has shown a very abnormal prevalence, the total number of cases reported being 50 per cent greater than that of the year before and exceeding the total number recorded for any previous year. The mildness of the disease has been so characteristic that it has not been infrequent to discover numerous pupils in the same room in school in the desquamating stage of the disease, none of them having given a history of any serious illness, and in many instances having been absent from school. The best evidence of the extreme mildness of the prevailing type of scarlet fever is the fact that the deaths are substantially the same as for previous years in spite of the great increase in the number of cases.

The incidence of diphtheria, approximately the same as the last few years, with deaths somewhat increased over the last two years, calls attention to the fact that much work remains to be done to control this serious disease, but it is evident that in those communities in which active immunization against diphtheria by the use of toxin-antitoxin mixture has been carried out thoroughly there has been a marked reduction both in the reported cases and in the fatalities.

The program of the Department for demonstrating to the medical profession and the general public the technique of procedure of the Schick test for diphtheria susceptibility and of active immunization by toxin-antitoxin has been carried on very actively during the past year and has evoked continued and accelerating interest. Such demonstrations have been carried out now in 98 cities and towns, nearly half of which communities are regularly maintaining diphtheria prevention clinics and in many of the smaller towns a very high percentage of the total school population has been immunized and practically all have been "Schicked." At the present time about a score of communities are still waiting for such demonstrations to be carried out. There seems at the present time to be no fact more positive than that diphtheria can be readily brought under almost complete control by the intelligent application of this measure. It is consequently expected that there will be a very marked reduction in both the incidence and fatality of diphtheria in the next three to five years as a result of the diphtheria prevention work now being actively carried on.

The continued remarkable decline in the incidence of typhoid fever has also been another outstanding feature of the communicable disease work for the year. Both the incidence and fatality records of this disease have established new records and as previously noted the autumnal prevalence of the disease disappeared entirely for the first time in our experience.

Tuberculosis has continued to show a steady decline in the total number of reported cases. This is the more encouraging because it is believed that by the intense effort thrown against tuberculosis for the last few years the medical profession generally has reported the early stages more completely than ever before and the still declining death rate testifies that this falling off in the number of reported cases represents a real and not a fictitious decline in the prevalence of the disease.

A word must be said in reference to rabies. Under the present objections against adequate restraining of dogs and the humane disposition of stray dogs, it seems impossible to avoid the occasional recrudescence of rabies in dogs. This year the cases of dog bite requiring treatment showed a decided increase over any year previously reported. Three cases of human rabies, all fatal, were also reported.

EPIDEMICS AND OUTBREAKS.

There have been no serious epidemics for the past year. Only 22 special outbreak notices have been sent out by our central epidemiological office, the lowest on record since the system was instituted. These were for the following conditions: 7 instances of unusual diphtheria prevalence indicating the possibility of a beginning epidemic; 9 of unusual incidence of scarlet fever; 4 for typhoid fever; and one each for influenza and septic sore throat.

Septic sore throat deserves special mention as the occurrence of this disease in Arlington closely approximated an epidemic. In all, 69 cases occurred in the town during the month of May. Investigation showed one of the dairymen on the premises supplying milk to all of these cases to have an infected hand. Bacteriological cultures taken from this infected hand showed streptococci present,

but not hemolytic streptococci. The responsible agent in the case was never definitely isolated. Pasteurization of the milk supply stopped the outbreak. This result adds another piece of evidence to the great mass already accumulated as to the effect of pasteurization for the control of those diseases transmissible by milk.

Two minor outbreaks of typhoid fever occurred during the year, one in Newburyport with a total of 12 cases in the months of September and October. It was impossible to definitely determine the source of this outbreak. There were also 11 cases reported in Taunton in the months of October and November which were due to a typhoid carrier. In all 9 new typhoid carriers were detected during the past year and placed under the usual supervision.

WORK OF THE DISTRICT HEALTH OFFICERS.

The activities of the field force have continued along the same general lines as in the past years, but three features of their work deserve special mention. In the first place, it is noticeable that the calls by the practicing physicians for consultation for the purpose of differential diagnosis in suspected communicable disease conditions continue to grow yearly and consume a large part of the time and energy of the district health officers. This is most valuable work inasmuch as in many of these instances it is possible for the district health officer to give advice which will lead to the prevention of what might otherwise prove a serious outbreak of infectious disease. It is gratifying to note that the medical profession is apparently placing more and more dependence upon the service of the field staff of the Department for this important purpose.

The second feature of the work of the district health officers to which they have given an unusual amount of time this year has been in promoting the campaign for diphtheria prevention. In each one of the seven districts, the district health officer has assiduously fostered this movement and has personally "Schicked" and examined thousands of children.

The third feature of the work of the district health officers has been that of assisting in the examination clinics conducted by the Division of Tuberculosis for the purpose of detecting the presence of juvenile tuberculosis. As this work has grown it has become evident that more time of the nursing assistants to the district health officers must be devoted to this important development. It was decided late in the year that it was best for the purpose of promoting this tuberculosis prevention program to transfer the nursing assistants to the Division of Tuberculosis. Here they will devote nearly their entire time in assisting in the program for the prevention of childhood tuberculosis. Transfer of the nurses to the more specialized field of tuberculosis control will result in the district health officers finding possibly that some of the phases of public health nursing work in their district will show a degree of slowing up compared to the rate of increase of progress in the past few years. On the other hand, the service of our nursing assistants in recent years has greatly stimulated the interest and viewpoint of the nurses employed by the local boards of health and in other local public health capacities and it is believed that they will go ahead vigorously with the development of the program in their separate communities even though they will not be able to profit by the assistance of the nursing assistants to the district health officers to such an extent as has been the case in the past.

The routine examinations of hospitals, jails, lock-ups, dispensaries, etc., as required by the various statutes have been performed by the district health officers in the several districts, and they or their nursing assistants have visited practically every city and town in the State in the course of their routine work during the past year.

VENEREAL DISEASE PROGRAM.

The work of the subdivision of venereal diseases for the past year has progressed in accordance with the program originally adopted. An interesting question during the year has been whether the decrease in the reported incidence of gonorrhea and syphilis for the past two or three years as contrasted with the previous two or three years represents a real decline in frequency or laxity on the part of physicians in reporting. Investigations that have been carried out by the subdivision

of venereal diseases during the past year tend to the conclusion that this decrease is actual and not merely fictitious and it is fair to conclude that the venereal disease program of the past five years has already achieved a marked degree of success.

Certain features of the work of the division deserve special attention. One of these has been the very excellent work carried out in the matter of securing the co-operation of druggists throughout the State in discontinuing the practice of selling proprietary or quack remedies for venereal disease conditions. One of our investigators has systematically visited the druggists of certain communities and while there still remain many communities to be covered he has met with remarkable success in this project. Practically all the druggists who have been approached, when the program was explained to them, have co-operated with splendid public spirit and have turned over to the Department all of the stock of proprietary remedies on hand and signed an agreement to refuse to dispense any such remedies in the future. It looks at the present time as if this very serious menace to the public health would in the near future become negligible.

Another feature of the work of the venereal disease subdivision which has been gratifying in the past year has been the effective manner in which the co-operation of the judges of the Superior and municipal courts and of probation officers throughout the State has been continued. The special service which the Department has maintained through the distribution of arsphenamine and the newer products of sulph-arsphenamine and bichloridol has been actively maintained and extended during the year and receives constantly the appreciation of the entire medical profession, both as evidenced by their increasing demands for these products and by their verbal and written comments upon the assistance it gives them for the control of venereal diseases.

BACTERIOLOGICAL LABORATORY.

The work of the Bacteriological Laboratory has followed the same lines as in other years. Approximately 33,000 examinations were made this year. This number of examinations represents about the maximum capacity for the present personnel and space of the laboratory. The laboratory is functioning smoothly and effectively and its work is much appreciated by the medical profession and local boards of health.

DIVISION OF TUBERCULOSIS (SANATORIA).

The past year has been one of great activity in the Division of Tuberculosis. The work of supplying statistics and other information requested by the Legislative Committee on State Administration for its consideration in connection with its study of the tuberculosis hospital problem of the State has in itself consumed a great deal of time on the part of the personnel of this Division.

For many years past we have been striving to achieve a complete and accurate follow-up system on all reported cases of tuberculosis and a still more detailed system covering former sanatorium cases. For several years this work has suffered in development because of inability to finance a supervisor for such work. This year the General Court acted favorably upon the recommendation of the Department and made it possible to create the new position of Supervisor of Tuberculosis Nursing Work which has been filled since June. Numerous improvements have already been made in all the record systems for the follow up of reported cases and with some slight additional changes it will be possible to collect practically complete and satisfactory records of all known cases of tuberculosis. The importance of such a system from the standpoint of effective control of the disease cannot be overestimated.

In connection with the sanatoria, the year's work has been exceedingly satisfactory. In line with the recommendations made by the Department last year and approved by the Legislature, an additional physician has been obtained for the staff of two of the sanatoria, Westfield and North Reading. Lack of housing facilities at the present time again stands in the way of adding an additional physician to each of the other two sanatoria. These physicians have been added primarily to furnish additional personnel in carrying out the program of examination clinics for children.

Except for a few vacant beds for men, the sanatoria have been utilized to capacity throughout the past year. For the last few months there has been a constantly increasing number of patients on the waiting list, more particularly women. It is obvious that in the near future an additional number of beds for children must be provided inasmuch as the waiting list at Westfield is now constant and at times becomes very long.

DISPENSARIES.

Although the tuberculosis dispensaries are perhaps the most important agency we have in the State for diagnosis and supervision of tuberculosis many are proving of little value to the community maintaining them or to the State. There are many reasons contributing to this condition. To get at the root of the trouble, legislation along lines recommended by the Department last year is suggested. Next in importance are closer supervision, up-to-date uniform records, and Department stimulation of the local work through conferences for the physicians and nurses.

CHILDREN'S CLINICS.

The work of examining "below par" and "directly exposed" groups of school children for the detection of beginning tuberculosis has been carried out in all portions of the State. This activity has been received most favorably in every community and requests for this type of service are constantly increasing. As the problem has already been treated in detail in a previous section of the report, I shall not go into the matter any further at this point.

Another feature which has been worthy of attention during the past year has been the growing inclination of medical societies to hold their meetings in the State sanatoria from time to time. At these meetings, clinical demonstrations of typical cases before small groups of physicians have been carried out by the staffs of the sanatoria. This year the Department has innovated the plan of inviting physicians in small groups to spend three days at the children's sanatorium in Westfield in order that they may become posted as to the modern methods of juvenile tuberculosis treatment. The reaction to this activity has been so marked and enthusiastic that the Department proposes as part of its regular program for the control of juvenile tuberculosis to hold these brief intensive "schools" for the study of juvenile groups as a constant feature of the work and to set aside a small sum of money to defray the expenses of sending local and dispensary physicians to these schools.

On the whole, it will be seen that never in the history of the State has the work of tuberculosis prevention been more promising. A comprehensive program for the control of the disease is now being gradually worked out. Clinics for diagnosis and supervision are quite generally established, even though some of them need considerable revision as to methods. The importance of systematic examinations for juvenile tuberculosis is now being generally recognized and a definite attempt to examine all underweight children has been made in many communities.

The problem of non-pulmonary tuberculosis is still inadequately handled and it is to be hoped that the incoming Legislature will act on the recommendation this Department made last year, and which has been endorsed by the Committee on State Administration, to enable us to remedy gradually the existing situation as to non-pulmonary tuberculosis.

DIVISION OF HYGIENE.

The activities of the Division of Hygiene fall into two major sections: (1) that portion of the work of the Division which is being carried out under the provisions of the maternal and infant-hygiene program, and (2) the work carried on by the Division prior to the adoption of this program.

1. *The Maternal and Child Hygiene Program.*

As pointed out in my last report, the program for this work as originally outlined contemplated three principal features:

(a) A study of all maternal deaths and a study of a sufficiently large number of infant deaths to enable sound conclusions to be drawn as to the causes thereof.

(b) A study of the resources of various cities and towns available for the promotion of child hygiene, thereafter advising cities and towns as to child hygiene measures that could reasonably be undertaken with due consideration of their financial and social conditions, and if possible a gathering together within each community of all the forces interested in conserving child life.

(c) Intensive publicity concerning the methods of promoting the health of mothers and children and of saving life from preventable causes.

A very brief statement of the progress of the work under the three headings above stated is given on page 29 of my report but a more detailed account can be found in the full report of the Division of Hygiene.

During the past year a special campaign called the "Baby Rights' Campaign" was carried out through which it is believed all the doctors and public health nurses and a large section of the public were reached. Leaflets suitable for these groups were prepared and distributed. This particular program, however, failed to be as effective as was anticipated because of difficulties in the matter of printing which were beyond the control of this Department.

Another very important feature of educational work in the Division's program has been a series of study courses for nurses on maternal and child hygiene. Between January and June the Department conducted a series of nine lecture courses of three days each at intervals of a week. They were held in various parts of the State selected as being naturally convenient centers for the congregating of the nurses of the district. These centers were Boston, Fall River, Greenfield, Lowell, New Bedford, Pittsfield, Sandwich, Springfield and Worcester. In all, nearly five hundred public health nurses out of a thousand such nurses in the State attended these conferences, and as a matter of fact a very high proportion of those who are doing genuine maternal or child hygiene work was reached. These conferences also furnished an opportunity for additional contact with local boards of health and officers of local medical societies.

2. *Other Phases of the Work of the Division of Hygiene.*

School Hygiene. During this year concentrated effort has been directed towards school hygiene. One of the physicians of the staff has devoted practically all of her time to the work of school hygiene and during the latter part of the year one of the nurses of the Department has been assigned to assist in this work.

Two definite lines of work carried out in this respect during the year have been: (1) the raising of the standard of medical and nursing service in the schools, and (2) the introduction into the schools of systematic health education. Great interest has been enlisted all over the State in the matter of raising the standard of school hygiene through the use of the physical record card which was prepared by this Department last year and adopted by the Department of Education. This card is now required for the school system of the State.

Several of our larger cities are now employing or are about to employ full-time medical directors of school hygiene.

A series of school hygiene conferences have been held throughout the year which have been attended by about 500 school nurses, doctors and teachers this year as last, and these conferences have been instrumental in increasing the interest in school hygiene all over the State.

An outline on hygiene was prepared for use in normal schools and presented to the Department of Education for adoption as part of their regular curriculum. The interest in the policy of carrying out systematic methods of health education as part of the regular school work has shown a distinct advance during the past year. Perhaps the city of Newton has developed the most complete method of health education as an incidental part of the regular school system of any of the cities of the State. Its work in this direction has been in many respects unique and has attracted attention throughout the country, but many other cities and towns throughout the Commonwealth are doing increasingly valuable work in the matter of health education in the schools.

Nutrition. In the field of nutrition a distinctly new feature of this year's work has been the instruction of mothers and children in food and its relationship to health through the examination clinics which the Division of Tuberculosis has carried on. This work has proved so valuable that it is planned to employ a group

of nutrition workers for this particular purpose as a part of the regular program for prevention of tuberculosis among school children.

There has been a constant demand for the services of the nutritionists in addressing groups of the public interested in nutrition and much new educational material in reference to the subject has been prepared for the use of the general public.

Dental Hygiene. Work in dental hygiene has been carried on along much the same lines as in the previous year. Interest in the subject of mouth hygiene is growing steadily and the number of communities which are making provision for preventive work among school children is extremely gratifying.

DIVISION OF BIOLOGIC LABORATORIES.

The important work of this Division has shown very marked increase during the past fiscal year. The increase in distribution of diphtheria toxin-antitoxin alone has amounted to approximately 20 per cent over that in 1922. The demand for smallpox vaccine has remained at practically a constant level for several years past but there has been an enormous increase in the demand for outfits for the Schick test and for the toxin-antitoxin mixture for active diphtheria immunization. The demand for these two products has been so great that it has been only with the greatest difficulty that the laboratory has at times been able to meet the situation. The labor problem involved has been met temporarily by engaging emergency assistance throughout the latter part of the fiscal year. This situation makes imperative a reorganization of personnel to a certain degree, the appointment of an additional labor force, and a substantial increase in appropriation both for personal services and for general expenses for the forthcoming fiscal year, if the laboratory is to supply these products at the rate at which they are needed by the public and the medical profession of the State. The following table emphasizes the need of prompt adjustments of the resources of the laboratory to meet this situation:

PRODUCT.	1919.	1920.	1921.	1922.	1923.
Diphtheria Antitoxin (1,000 unit doses) . . .	170,319	218,227	261,024	336,730	413,935
Antimeningococcic Serum (15 c.c. doses) . . .	4,547	3,585	3,444	4,296	4,642
Antipneumococcic Serum (100 c.c. doses) . . .	621	444	649	721	352
Smallpox Vaccine Virus (capillary tubes) . . .	194,807	189,064	197,733	189,215	198,066
Typhoid-Paratyphoid Vaccine (1 c.c. doses) . . .	74,123	49,191	55,804	66,959	61,980
Schick Outfits, 50 doses each . . .	88	126	547	3,235	5,816
Diphtheria Toxin for Schick Test (bulk, c.c.) . . .	—	—	32	155½	170
Diphtheria Toxin-antitoxin Mixture (1 c.c. doses) . . .	1,198	3,614	9,414	96,407	176,552
Normal Serum, c.c.	—	—	9,788	4,665	7,670

During the past year much extra laboratory equipment has been installed and the physical condition of the buildings, both laboratory and stables, has been greatly improved. The most serious and pressing question is the need of additional space. The present laboratory buildings and stables are now crowded to their full capacity and will soon reach a point where it will be impossible to meet the greater demands which may be anticipated. The gravity of this predicament has been touched upon for a number of years in our annual reports. Therefore, I will not go into further particulars at the present time. I will merely state that the point has been reached where it is obvious that there must be provided either a new laboratory building or additions to the present building, or the State must definitely abandon its program for manufacturing and distributing these biologic products so essential to the saving of human life.

An interesting feature of the work of this Division in the past year has been the increasing degree to which our laboratory is being sought as a place of instruction. Students specializing in the manufacture of biologic products have been sent at various times from the International Health Board and the Harvard School of Public Health for brief periods of instruction. The Laboratory has also had many distinguished visitors from foreign countries including delegates of the Health Bureau of the League of Nations. Two foreign graduate students have remained throughout practically the entire year to prosecute original investigations and they have been of very great assistance in the routine work of the laboratory. The co-operative relations between the Department of Bacteriology of the Harvard Medical School and the Harvard School of Public Health has been maintained on a more effective basis than ever in the past year.

WORK OF THE WASSERMANN LABORATORY.

The work of the Wassermann Laboratory has continued to show a sharp increase over previous years. This showing has been somewhat of a surprise to the staff of the Department. It had been felt that possibly the laboratory was furnishing the maximum amount of service that would be required by the medical profession, but if this year's experience is any criterion the prospect of having the number of requests for examinations grow indefinitely must be anticipated. Perhaps it is not improbable that within a few years as many as 100,000 examinations annually may be required from this laboratory.

DIVISION OF FOOD AND DRUGS.

The Division of Food and Drugs of the Department has more varied duties perhaps than any other Division, for in addition to the duties indicated by its title it is also responsible under the provisions of various statutes for the supervision of the business of slaughtering, for the control of the cold storage industry, for the manufacture of arsphenamine, for the supervision of factories manufacturing mattresses, and for the quality of anthracite coal. Under the law it must also make examinations of drugs, chemicals, and poisons for the police authorities. Jointly with the local health authorities, this Division is responsible for the sanitation of bakeries and soft drink manufactories, and jointly with the Sealers of Weights and Measures of the State, it is responsible for the quality of anthracite coal supplied to the general public.

During the past fiscal year, at the request of the Commission on Administration and Finance, an additional type of activity has been added to the work of this Division through the transfer to it of the analytical laboratory maintained for several years past by the Department of Mental Diseases for the purpose of passing upon the quality of food and other products furnished under contract for the institutions of that Department. The new Commission on Administration and Finance has extended this type of chemical examination to include many types of purchases made through its Purchasing Bureau for all State institutions, and under this new arrangement many examinations have been made.

Perhaps the most striking feature of the work of this Division for the past year has been that connected with the so called fire-proof coal legislation. Reference has already been made to this matter earlier in this report and it is only desired here to note that as a result of the demand for such coal analyses it has been necessary to secure additional personnel for the Division. This work will probably continue to be rather constant, although the opinion was expressed that after the law had been in operation a short time there would be but few calls for coal examination. In this connection a problem of administration has been brought about, that of the disposal of coal when found to be below combustible standards. Under the statute, this Department is empowered to confiscate such coal. During the year four carload lots have been seized and this has placed an added financial burden upon the Division which may continue indefinitely in the future.

One interesting feature of the work of the Division has been the fact that there has been an increase in the number of liquor samples taken by the police authorities. This work has now grown to very heavy proportions. Detailed statistics can be found in the full report of the Division.

There has been considerable activity during the past year in the inspection of mattresses. In former years, the principal activity has been directed against the sale of mattresses not tagged in accordance with law which requires a statement of the ingredients used for filling. At the present time practically all mattresses bear such a label. During the past year the Division has concentrated largely upon the problem of stopping the use of second-hand material in the manufacture of mattresses. It is extremely difficult to collect evidence of this nature sufficient to sustain an action in a court of law, but there have been two successful prosecutions during the past year.

There have been no unusual features in the supervision of cold storage this year except that the very large pack of mackerel in 1922 could not be disposed of during the following twelve months allowed for storage under the law, and inasmuch as this valuable food fish was found to be in good condition, a further extension

of storage was granted under the provisions of the law authorizing such extensions.

There has been a very marked increase in the demand for arsphenamine manufactured by this Division. During the past year sulfarsphenamine has been produced on an experimental basis but its use has been so gratifying to the medical profession of the State that a heavy demand for this product is indicated. It does not seem likely, however, that this demand will be accompanied by any reduction in the demand for arsphenamine. At the present time the increase in the demand for arsphenamine is about 25 per cent annually.

From the standpoint of the law-enforcing activities of the Division, I would report that 275 prosecutions have been carried out during the past year. Convictions were obtained in 256 instances. In 71 instances extensions of time on goods in cold storage were granted on the petition of the owner. Seven such requests were refused and in 78 instances lots which had been in storage for the full 12 months without requests for extension having been made, were ordered out of storage. Twenty-nine confiscations of varying amounts were made of food products in warehouses and five in stores and markets.

Appended is a summary of the kinds of samples examined by this Division for the past fiscal year and the year 1922.

	1923.	1922.
Milk	6,367	7,215
Foods other than milk	1,796	2,075
Drugs	306	317
Liquor	6,367	5,766
Narcotics, etc.	150	208
(?)Coal (inspection only)	236	—
Total	15,222	15,581

In addition to this work, there have been carried out for the past few months in the analytical laboratory for the Purchasing Department of the Commission on Administration and Finance a large number of examinations.

APPROPRIATIONS AND EXPENDITURES FOR THE YEAR ENDED NOV. 30, 1923.

	Appropriations.	Expended.
Division of Administration	\$28,986.13	\$27,520.04
Division of Hygiene	39,511.69	38,180.64
Welfare of Mothers and Children	45,051.00	41,375.57
Division of Communicable Diseases	78,700.00	77,302.22
Sub-division Venereal Diseases	41,318.82	34,508.50
Manufacture and Distribution Arsphenamine	18,971.80	16,781.22
Division of Food and Drugs	48,751.10	47,102.37
Division of Biologic Laboratories		
Antitoxin and Vaccine Laboratory	65,622.56	65,231.24
Wassermann Laboratory	16,635.02	16,294.48
Division of Tuberculosis	19,400.00	18,507.03
Subsidies to Cities	180,028.64	178,795.07
Division of Sanitary Engineering	52,606.20	47,524.18
Division of Water and Sewage Laboratories	37,200.00	37,025.75
Examiners of Plumbers	5,016.50	5,028.50
Penikese Hospital	1,505.98	1,217.98
Totals	\$679,305.44	\$652,394.79

SPECIAL APPROPRIATIONS AND EXPENDITURES FOR THE YEAR ENDED NOV. 30, 1923.

	Appropriation.	Expended.	Balance.
Neponset Valley Restoration Rights of Way			
1922 balance	\$4,247.09	\$3,601.45	\$645.64
Neponset Valley Real Estate Betterment Assessments, 1922 balance	7,415.00	3,303.98	4,111.02
Neponset Valley Expert Testimony, 1923 appropriations	5,000.00	2,134.11	2,865.89
Investigation of Sewerage System Salem, Beverly, Peabody and Danvers, 1923 appropriations	4,000.00	1,939.32	2,060.68
Merrimack Valley Investigation, 1923 appropriation	20,000.00	7,383.01	12,616.99
Tuberculosis Investigation, 1922 balance	2,754.10	697.93	2,056.17
Totals	\$43,416.19	\$19,059.80	\$24,356.39

EXPENDITURES OF TUBERCULOSIS SANATORIA FOR THE YEAR ENDED
Nov. 30, 1923.

	Rutland.	Lakeville.	Westfield.	North Reading.	Totals.
Appropriation for maintenance .	\$324,067.45	\$202,310.00	\$207,146.77	\$154,842.96	\$886,367.18
Personal services	135,333.71	94,961.70	89,462.60	71,562.75	391,320.76
Religious instruction . . .	1,777.50	1,255.00	1,219.60	1,600.00	5,852.10
Travel, transportation and office expenses	3,134.09	2,400.78	3,035.53	1,809.96	10,380.36
Food	74,810.46	26,999.71	33,072.14	41,020.89	175,903.20
Clothing and materials . . .	198.14	—	1,144.83	56.52	1,399.49
Furnishings and household supplies	10,247.39	7,097.75	11,332.75	5,100.99	33,778.88
Medical and general care . .	9,253.51	4,697.74	3,341.99	3,244.64	20,537.88
Heat, light and power . . .	28,423.74	26,092.34	18,803.81	10,506.28	83,826.17
Farm	12,120.70	26,099.37	14,561.56	4,789.23	57,570.86
Garage, stable and grounds .	2,959.53	4,149.22	2,931.94	1,454.23	11,494.92
Repairs, ordinary	9,395.30	6,947.71	9,787.57	2,953.24	29,083.82
Repairs and renewals . . .	7,006.95	1,492.58	18,013.15	3,646.49	30,159.17
Total expenditures	\$294,661.02	\$202,193.90	\$206,707.47	\$147,745.22	\$851,307.61
Unexpended balance . . .	\$29,406.43	\$116.10	\$439.30	\$7,097.74	\$37,059.57
Average number of inmates .	353	221	265	188	1,027
Weekly per capita cost . . .	\$16.04	\$17.63	\$14.98	\$15.10	
Receipts for board of inmates .	\$80,448.61	\$29,782.60	\$43,620.12	\$29,662.10	\$183,513.43
Receipts from sales	3,416.87	1,187.92	2,827.71	369.71	7,680.35
Total receipts	\$83,865.48	\$30,970.52	\$46,447.83	\$30,031.81	\$191,193.78

EUGENE R. KELLEY, M.D.,
Commissioner of Public Health.

Report of Division of Sanitary Engineering

X. H. Goodnough, *Director and Chief Engineer.*

OVERSIGHT AND CARE OF INLAND WATERS.

Water Supply and Sewerage.

The Division received during the year 1923 a total of 241 applications for advice with reference to water supply, drainage and sewerage, the largest number for many years. Of these applications, 164 related to water supply, 9 to sources of ice supply, 29 to sewerage, 9 to pollution of streams, and 30 to miscellaneous matters.

A water supply was introduced near the end of the year 1923 in the town of Warren, increasing to 218 the total number of cities and towns supplied with water from public works out of the total of 355 cities and towns in the State. The total population of these cities and towns, according to the census of 1920, is 3,706,016, while that of the 137 towns which have no general system of water supply is 146,340; thus, about 96 per cent of the inhabitants of the State live in cities and towns supplied with water from public works.

Water Supply Needs and Resources.

The seriousness of the water supply situation in many of the communities of the Commonwealth, of which warning has been given in previous reports, has been strongly emphasized by experience in 1923. Very serious shortages of water have occurred in many communities entailing in some cases the necessity of drastic restrictions on water consumption and the prevention of its use for essential purposes which in some cases seriously affected the public comfort and in others made necessary the taking of water from sources of inferior quality, the use of which involved danger to the public health.

The health of the State has improved constantly for many years with the increase in scientific knowledge and consequent improvement in public sanitation, in which a most important factor is a pure and adequate water supply. The continuance of this improvement is now menaced by the conditions affecting many of the public water supplies, chiefly by reason of the fact that adequate provision has not been made to meet the needs of the immediate future under unfavorable weather conditions, of which the past year has furnished but a brief example. Notwithstanding the drouth of last summer and autumn, the rainfall for 1923 in the State as a whole has been approximately equal to the average for a long period of years. In certain areas the precipitation has been considerably above the average as, for example, in the watersheds of the Sudbury and Nashua rivers, from which is drawn the water supply of the Metropolitan Water District and a part of that of the city of Worcester. The reason for the shortage of water supplies in a year in which the rainfall in the State as a whole nearly equalled the average is found chiefly in the fact that the use of water in many communities exceeds the safe capacity of the sources of supply. That shortages in many of the water supplies have not occurred before is due to the further fact that since 1911 the rainfall on the whole has been gradually increasing and for several years continuously has been favorably distributed for water supply purposes besides being generally in excess of the average. During these years also there has been a constant increase in water consumption until at the present time the quantity of water used in most communities exceeds by 20 to 40 per cent or more the amount required 8 or 10 years ago. With a drop in precipitation to average conditions in parts of the State and with the greater part of the rainfall concentrated in the first 4 and last 3 months of the year, leaving a considerable deficiency in the remaining months, the inevitable result was the occurrence of serious shortages in many places.

In the report of last year it was shown that water consumption in a large number of very fully metered cities and towns outside of the Metropolitan district has been increasing at rates of from 3.2 to 3.5 per cent per year. Yet, since the beginning of the war, water works construction has practically halted on account of

the deterrent effect of the increase in the cost of construction, in the apparently delusive hope of an immediate return to pre-war conditions. The experience of the past year has been no doubt a sufficient warning in certain cases to lead to improvement, but many cities and towns are supplied from large storage reservoirs adequate to tide over a drouth of two or three years' duration, and on these sources a short drouth like that of 1923 has little serious effect, provided the total yearly precipitation is not deficient. The water supply of the Metropolitan Water District is typical of such sources. The great Wachusett Reservoir on the Nashua River is capable of supplying the present Metropolitan Water District for more than a year at the present rate of water consumption if no water ran into it, but it is necessary to remember that the present quantity of water stored there is the accumulation of previous years in which the quantity drawn from it was much less than will hereafter be the case, for the quantity of water drawn in each year from the Wachusett and Sudbury reservoirs, including Basin 3, already exceeds the average yearly quantity of water which runs into these reservoirs. Under these conditions with an increasing water consumption their gradual depletion is inevitable hereafter, unless the draft upon them is reduced or other sources provided, or unless a high rainfall continues for an unprecedented period. Even in the brief period of low rainfall in the summer and early autumn of 1923, the reservoir was drawn down faster and farther than ever before in so brief a time. This occurrence is an indication of what would happen in a period of dry years such as have occurred five or six times in the past century, yet the yield of the Wachusett Reservoir during 1923 was above the average for the 27 years since measurements of the flow of the Nashua River were begun. The average daily flow per square mile of watershed in that period has been 1,101 million gallons, while in 1923 it amounted to 1,207 million gallons, or 10 per cent in excess of the average. In 7 of the 27 years during which the flow has been measured the yield has been more than 18 per cent less than the average, and in the dry period 1908-11 the yield for 4 continuous years was over 25 per cent less than the average. Periods of years of low rainfall will inevitably continue to occur in the future as they have in the past, and a period of dry years such as that just referred to, if it should occur in the immediate future, would exhaust the Wachusett supply.

Under present conditions, the Metropolitan district is using all of the water of good quality that its sources are capable of supplying and somewhat more, and in case of a dry period dependence would have to be placed upon the inferior supplies obtainable from the South Sudbury and Cochituate sources, which are unfit for use unless properly filtered. Even with filtration and the use of these sources to their fullest capacity, the supply of water available to the district will be sufficient for only a few years, the length of the period depending upon the growth of population and the increase in the use of water and upon the quantity of water required for other communities which, though not members of the Metropolitan Water District, nevertheless depend upon it for their increasing needs in case of a drouth.

The population of the Metropolitan Water District and of the communities about it in which the consumption of water has reached or will shortly reach the safe yield of their present sources of supply, including the city of Worcester, increased in the 10 years from 1910 to 1920 from 1,456,914 to 1,708,850, an increase of 251,936, or 17 per cent. That is, the growth in these 10 years was equivalent to the addition of a city approximately the size of Providence, Rhode Island. The total consumption of water by this population in the first 9 months of 1923 amounted to over 173 million gallons per day, while the aggregate safe yield of the present sources of supply in a dry period is less than 200 million gallons per day, leaving a surplus of some 25 million gallons per day, including the yield of the Southern Sudbury and Cochituate sources. Thus, these communities are using 87 per cent of the safe yield of all their sources of supply and over 100 per cent of the safe yield of those sources which are capable of yielding good water.

Some of the sources included in this group of municipalities have become inadequate during the past year and water has been drawn from the Metropolitan sources to supplement them. In others the experience in the brief drouth of 1923 has indicated clearly the need of providing additional sources of supply for future requirements. The increase in the average daily consumption of water in these

places between the years 1915 and 1922, years in which the conditions affecting the use of water were quite comparable and which undoubtedly represent conditions of minimum increase, amounted to 25,290,000 gallons, or 3,613,000 gallons per year.

This Department has recommended in previous reports an investigation of the question of providing additional water supplies for the cities and towns dependent for all or a part of their water supply upon the Ipswich River.

These municipalities include the cities of Salem, Beverly and Peabody and the town of Danvers, while the town of Marblehead, though not taking water from the Ipswich valley, is likely to look either to that source or to some of its neighbors for additional water when needed, since the consumption of water in the town already probably equals the safe yield of its sources of supply. All of these municipalities, except Marblehead, depend for their water supplies upon storage reservoirs of considerable size and, while these were depleted, in some cases seriously, during the short period of dry weather in 1923, the supplies proved adequate for all requirements. Nevertheless, all of these municipalities are now using water in excess of the safe yield of their sources of supply and, unless immediate provision is made for their requirements, shortages will inevitably be experienced in the next dry period.

The town of Danvers can probably supply itself for some years to come with an additional supply from Boston Brook, which the town is authorized to take under the provisions of a legislative act, through works which can be built in a few months, but in the case of Salem, Beverly and Peabody joint action is likely to be necessary either for the construction of storage reservoirs in the Ipswich River watershed or for securing additional water from some other source. In either case, the construction of necessary works would require many months and possibly several years, and a beginning upon this most important work should not be longer delayed.

Serious conditions also exist as regards water supply in the Merrimack Valley, but as this question was investigated and a report presented to the Legislature of last year (House Document 1450, 1923) reference is made to that document for information on a water supply for that section of the State.

THE SANITARY PROTECTION OF WATER SUPPLIES.

Under the provision of Chapter 111 of the General Laws, rules and regulations were established by this Department during the past year for the sanitary protection of the water supply of the Ashfield Water Company and for the water supply of the Cohasset Water Company. Rules and regulations have been adopted by this Department for the protection of the water supply of the following cities, towns and districts in addition to the Metropolitan Water Supply up to the end of the fiscal year, 1923:

Abington & Rockland	Fall River	Lynn
Adams	Falmouth	Marlborough
Amherst	Fitchburg	Maynard
Andover	Gardner	Medfield (State Hospital)
Ashburnham	Great Barrington	Montague
Ashfield	(Housatonic)	Newburyport
Attleboro	Greenfield	Northampton
Braintree	Haverhill	North Andover
Brockton & Whitman	Hingham & Hull	Northborough
Cambridge	Holden	Norwood
Chester	Holyoke	Peabody
Chicopee	Hudson	Pittsfield
Cohasset	Lee	Plymouth
Concord	Leicester (Cherry Valley	Randolph & Holbrook
Dalton	& Rochdale)	Rockport
Danvers & Middleton	Leominster	Russell
Easthampton	Lincoln & Concord	

EXAMINATION OF PUBLIC WATER SUPPLIES.

The public water supplies of the State have been examined as usual during the year by the engineers of this division and samples of the water of the various

sources have been analyzed chemically and microscopically, the latter in the case of surface waters, while bacterial examinations have been made of those waters where such tests appeared to be necessary or desirable. The results of the chemical analyses and bacterial examinations have shown that several of the water supplies of the state, especially those where the draft is nearly equal to the safe yield, deteriorated in quality somewhat during the period of a short drouth in the late summer and early autumn. The following are the average yearly results of chemical analyses of samples of water from public sources examined during the year 1923.

ANALYSES OF THE WATER OF PUBLIC WATER SUPPLIES.

Averages of Chemical Analyses of Surface-Water Sources for the Year 1923.

[Parts in 100,000.]

CITY OR TOWN.	Source.	Color.	Residue on Evaporation.	AMMONIA.			Chlorine.	Hardness.
				Free.	ALBUMINOID.			
					Total.	Suspended.		
Metropolitan Water District	Wachusett Reservoir, upper end	.23	3.76	.0026	.0116	.0020	.24	1.1
	Wachusett Reservoir, lower end	.11	3.48	.0018	.0111	.0020	.20	1.3
	Sudbury Reservoir	.12	3.78	.0024	.0107	.0014	.21	1.3
	Framingham Reservoir No. 3	.14	3.98	.0029	.0117	.0021	.24	1.5
	Hopkinton Reservoir	.53	4.39	.0020	.0141	.0026	.31	1.3
	Ashland Reservoir	.58	4.43	.0021	.0149	.0023	.25	1.3
	Framingham Reservoir No. 2	.71	7.75	.0090	.0184	.0027	.90	1.9
	Lake Cochituate	.17	6.66	.0027	.0238	.0104	.59	2.6
	Chestnut Hill Reservoir	.15	3.96	.0018	.0115	.0018	.25	1.4
	Weston Reservoir	.13	3.73	.0017	.0114	.0022	.24	1.4
	Spot Pond	.06	3.69	.0015	.0131	.0020	.26	1.4
	Tap in State House	.15	4.02	.0011	.0101	.0012	.26	1.6
	Tap in Revere	.07	3.67	.0018	.0120	.0021	.28	1.6
	Tap in Quincy	.12	3.85	.0011	.0096	.0013	.24	1.6
Abington	Big Sandy Pond	.05	4.12	.0051	.0129	.0020	.76	0.7
Adams (Fire District)	Dry Brook	.12	8.26	.0018	.0072	.0011	.12	5.9
	Bassett Brook	.00	7.14	.0010	.0033	.0005	.12	5.3
Amherst	Amethyst Brook large reservoir	.41	3.98	.0028	.0154	.0042	.11	0.7
	Amethyst Brook small reservoir	.18	3.35	.0041	.0141	.0052	.11	0.9
Andover	Haggett's Pond	.16	4.43	.0031	.0156	.0023	.29	1.4
Ashburnham	Upper Naukeag Lake	.04	2.28	.0010	.0071	.0007	.12	0.3
Ashfield	Bear Swamp Brook	.26	5.45	.0011	.0099	.0009	.09	2.9
Athol	Phillipston Reservoir	.55	4.52	.0015	.0346	.0125	.13	1.1
	Buckman Brook Reservoir	.14	3.09	.0015	.0127	.0035	.12	0.7
	Thousand Acre Meadow Brook	1.40	6.34	.0058	.0336	.0057	.14	1.9
	Inlet of filter	.69	5.29	.0036	.0222	.0048	.13	1.4
	Outlet of filter	.52	4.30	.0060	.0160	.0025	.12	1.2
	Reservoir	.08	3.75	.0059	.0151	.0031	.20	1.2
Barre								
Blandford (Fire District)	Freeland Brook	.01	4.08	.0007	.0041	.0009	.23	1.5
BROCKTON	Silver Lake	.10	3.98	.0028	.0144	.0032	.54	0.8
Brookfield	Cooley Hill Reservoir	.01	3.57	.0005	.0083	.0020	.31	1.7
CAMBRIDGE	Lower Hobbs Brook Reservoir	.19	5.76	.0034	.0188	.0031	.34	2.4
	Upper Hobbs Brook Reservoir	.50	6.01	.0050	.0210	.0028	.36	2.3
	Stony Brook Reservoir	.31	6.42	.0038	.0188	.0031	.41	2.6
	Fresh Pond	.20	7.29	.0059	.0197	.0056	.51	3.2
Cheshire	Thunder Brook	.00	8.25	.0012	.0026	.0004	.08	6.0
	Kitchen Brook	.00	6.70	.0033	.0045	.0016	.07	4.0
CHICOPEE	Morton Brook	.03	4.53	.0029	.0041	.0011	.20	1.1
	Cooley Brook	.30	4.82	.0054	.0082	.0015	.16	1.5
Clinton	Tap in town	.16	3.59	.0028	.0096	.0021	.20	1.7
Colrain (Griswoldville)								
Colrain (Fire District No. 1)	McClellan Reservoir	.01	7.82	.0007	.0048	.0009	.09	5.1
Concord	Mountain Brook Reservoir	.02	8.48	.0008	.0062	.0011	.10	6.4
Dalton (Fire District)	Nagog Pond	.02	2.97	.0032	.0112	.0013	.34	0.8
	Egypt Brook Reservoir	.18	3.45	.0013	.0096	.0012	.09	1.1
	Windsor Reservoir	.25	5.35	.0026	.0186	.0036	.07	2.5
	Cady Brook	.25	4.96	.0013	.0120	.0019	.09	2.2
Danvers	Middleton Pond	.43	4.53	.0048	.0187	.0030	.26	1.5
	Swan Pond	.20	4.15	.0031	.0170	.0031	.26	1.3
Deerfield (South Deerfield Water Supply District)	Roaring Brook	.02	6.51	.0005	.0044	.0003	.14	4.0
Egremont (South)	Goodale Brook	.00	4.65	.0004	.0016	.0000	.08	2.9
FALL RIVER	North Watuppa Lake	.10	3.86	.0023	.0129	.0024	.41	0.9
Falmouth	Long Pond	.03	3.75	.0017	.0097	.0023	1.01	0.5
FITCHBURG	Meetinghouse Pond	.03	3.01	.0090	.0148	.0037	.15	0.8
	Scott Reservoir	.07	3.04	.0076	.0162	.0045	.17	0.6
	Wachusett Lake	.06	3.02	.0071	.0123	.0022	.14	0.7
	Falulah Brook	.12	3.12	.0048	.0126	.0018	.16	0.6
	Ashby Reservoir	.42	3.46	.0102	.0252	.0082	.14	0.4
Gardner	Crystal Lake	.04	5.14	.0029	.0124	.0020	.30	2.2

Averages of Chemical Analyses of Surface-water Sources, etc. — Continued.

[Parts in 100,000.]

CITY OR TOWN.	Source.	Color.	Residue on Evaporation.	AMMONIA.			Chlorine.	Hardness.
				Free.	ALBUMINOID.			
					Total.	Sus- pended.		
GLOUCESTER . . .	Dike's Brook Reservoir . . .	.32	3.82	.0048	.0110	.0023	.65	0.6
	Wallace Reservoir . . .	.54	4.40	.0014	.0133	.0027	.72	0.8
	Haskell Brook Reservoir . . .	.18	3.71	.0018	.0096	.0019	.64	0.8
Great Barrington (Fire District) . . .	East Mountain Reservoir . . .	.06	7.06	.0060	.0172	.0087	.10	3.7
	Green River . . .	.01	9.92	.0014	.0068	.0008	.08	7.9
Great Barrington (Housatonic) . . .	Long Pond . . .	.00	6.65	.0058	.0122	.0004	.12	7.0
Greenfield . . .	Glen Brook Upper Reservoir . . .	.02	5.80	.0067	.0085	.0018	.10	3.4
	Glen Brook Lower Reservoir . . .	.01	6.48	.0035	.0079	.0017	.12	3.5
Hadley (Water Sup- ply District) . . .	Hart's Brook Reservoir . . .	.14	3.97	.0077	.0093	.0022	.18	1.5
Hatfield . . .	Running Gutter Brook Reservoir . . .	.07	6.52	.0004	.0058	.0017	.23	2.6
HAVERHILL . . .	Johnson's Pond . . .	.17	5.21	.0013	.0137	.0016	.35	2.5
	Crystal Lake . . .	.13	3.85	.0016	.0140	.0020	.25	1.3
	Kenoza Lake . . .	.10	4.99	.0042	.0182	.0042	.33	2.2
	Lake Saltonstall . . .	.03	6.79	.0030	.0139	.0027	.54	3.2
	Pentucket Lake . . .	.11	4.56	.0030	.0178	.0052	.33	2.1
	Millvale Reservoir . . .	.45	5.41	.0036	.0164	.0032	.29	2.0
Hingham . . .	Accord Pond . . .	.18	3.49	.0028	.0108	.0018	.51	0.7
	Fulling Mill Pond . . .	.33	5.41	.0034	.0119	.0028	.61	1.9
Hinsdale (Fire Dis- trict) . . .	Reservoir . . .	.10	2.78	.0008	.0075	.0013	.09	0.7
HOLYOKE . . .	Whiting Street Reservoir . . .	.04	5.52	.0042	.0134	.0019	.18	2.9
	Fomer Reservoir . . .	.20	4.02	.0033	.0133	.0019	.12	1.4
	Wright and Ashley Pond . . .	.06	5.07	.0032	.0131	.0033	.13	2.5
	High Service Reservoir . . .	.06	3.80	.0047	.0157	.0021	.13	1.6
	White Reservoir . . .	.15	3.74	.0044	.0160	.0030	.12	1.3
Hudson	Gates Pond . . .	.04	3.32	.0032	.0140	.0023	.19	1.5
Huntington (Fire District) . . .	Cold Brook Reservoir . . .	.07	3.51	.0005	.0040	.0004	.12	1.2
Ipswich . . .	Dow's Brook Reservoir . . .	.33	7.15	.0032	.0160	.0017	.66	2.7
LAWRENCE . . .	Merrimack River, filtered . . .	.39	6.73	.0055	.0084	—	.67	1.2
Lee . . .	Codding Brook Upper Reservoir . . .	.05	4.35	.0027	.0073	.0019	.11	2.2
	Codding Brook Lower Reservoir . . .	.04	4.43	.0027	.0065	.0014	.11	2.6
	Basin Pond Brook . . .	.29	3.88	.0012	.0103	.0014	.10	1.8
Lenox . . .	Reservoir . . .	.02	7.91	.0010	.0066	.0013	.10	6.3
	Laurel Lake . . .	.13	14.87	.0042	.0174	.0038	.18	16.2
LEOMINSTER . . .	Morse Reservoir . . .	.17	2.72	.0047	.0135	.0014	.15	0.5
	Haynes Reservoir . . .	.14	2.48	.0093	.0166	.0033	.14	0.3
	Fall Brook Reservoir . . .	.09	2.78	.0038	.0122	.0027	.14	0.4
	Sandy Pond . . .	.06	3.50	.0013	.0133	.0015	.27	0.8
Lincoln . . .	Cooley Brook . . .	.06	5.11	.0034	.0094	.0020	.21	2.8
Longmeadow . . .	Birch Reservoir . . .	.07	4.64	.0069	.0160	.0029	.56	1.9
LYNN . . .	Breed's Reservoir . . .	.24	5.69	.0052	.0156	.0021	.58	2.3
	Walden Reservoir . . .	.40	6.17	.0051	.0167	.0030	.57	2.6
	Hawkes Reservoir . . .	.50	6.87	.0074	.0237	.0046	.63	2.9
Manchester . . .	Gravel Pond . . .	.09	4.06	.0017	.0113	.0016	.68	1.1
MARLBOROUGH . . .	Lake Williams . . .	.06	4.83	.0035	.0148	.0020	.46	2.1
	Milham Brook Reservoir . . .	.42	5.22	.0046	.0172	.0021	.31	1.7
Maynard . . .	White Pond . . .	.10	2.99	.0005	.0099	.0015	.22	0.9
Milford . . .	Charles River, filtered . . .	.12	5.27	.0013	.0077	—	.30	2.2
Nantucket . . .	Wannacomet Pond . . .	.03	7.23	.0058	.0109	.0029	2.27	1.9
NEW BEDFORD . . .	Little Quittacas Pond . . .	.35	4.30	.0031	.0149	.0024	.42	0.9
	Great Quittacas Pond . . .	.47	3.99	.0028	.0157	.0023	.40	0.8
NEWBURYPORT . . .	Artichoke River . . .	.39	7.50	.0251	.0332	.0082	.52	2.7
NORTH ADAMS . . .	Notch Brook Reservoir . . .	.02	7.72	.0020	.0055	.0005	.08	6.8
	Broad Brook . . .	.13	4.85	.0013	.0069	.0012	.10	3.0
	Mount Williams Reservoir . . .	.02	6.80	.0016	.0076	.0012	.09	5.3
NORTHAMPTON . . .	Middle Reservoir . . .	.18	4.74	.0023	.0114	.0027	.12	1.9
	Mountain Street Reservoir . . .	.05	4.62	.0016	.0078	.0012	.11	2.0
North Andover . . .	Great Pond . . .	.20	4.85	.0053	.0123	.0011	.35	2.1
Northborough . . .	Lower Reservoir . . .	.53	4.85	.0056	.0240	.0078	.19	1.2
	Upper Reservoir . . .	.76	4.87	.0053	.0219	.0059	.19	1.2
North Brookfield . . .	Doane Pond . . .	.48	4.43	.0107	.0267	.0048	.18	1.1
	North Pond . . .	.49	4.40	.0100	.0278	.0065	.19	1.1

Averages of Chemical Analyses of Surface-water Sources, etc. — Concluded.

[Parts in 100,000.]

CITY OR TOWN.	Source.	Color.	Residue on Evaporation.	AMMONIA.			Chlorine.	Hardness.
				Free.	ALBUMINOID.			
					Total.	Sus- pended.		
Northfield	Reservoir . . . .	.02	3 55	.0004	.0034	.0003	.10	1.0
Norwood	Buckmaster Pond . . . .	.16	4 63	.0115	.0193	.0048	.42	1.5
Orange	Reservoir . . . .	.05	3 75	.0003	.0022	.0003	.13	1.1
Palmer (Fire District No. 1)	Lower Reservoir . . . .	.21	3 85	.0074	.0116	.0037	.16	1.3
PEABODY	Spring Pond . . . .	.23	5 65	.0093	.0137	.0026	.58	2.2
	Suntaug Lake . . . .	.02	5 28	.0117	.0157	.0030	.79	2.4
PITTSFIELD	Ashley Lake . . . .	.11	4 80	.0019	.0113	.0013	.12	2.7
	Ashley Brook . . . .	.21	5 27	.0033	.0100	.0011	.12	3.0
	Hathaway Brook . . . .	.04	9 31	.0015	.0054	.0015	.13	8.4
	Mill Brook . . . .	.43	4 90	.0046	.0148	.0023	.11	1.9
	Sackett Brook . . . .	.04	7 56	.0011	.0052	.0011	.12	6.1
	Farnham Reservoir . . . .	.48	4 77	.0027	.0229	.0064	.12	1.6
Plymouth	Little South Pond . . . .	.01	2 45	.0023	.0117	.0019	.55	0.2
	Great South Pond . . . .	.00	2 81	.0013	.0134	.0021	.61	0.2
Randolph	Great Pond . . . .	.29	4 89	.0022	.0140	.0018	.52	1.6
Rockport	Cape Pond . . . .	.33	9 55	.0099	.0179	.0037	3.43	1.8
Russell	Black Brook . . . .	.06	3 95	.0007	.0080	.0010	.11	0.9
Rutland	Muschopauge Lake . . . .	.01	2 90	.0036	.0109	.0022	.26	1.0
SALEM	Wenham Lake . . . .	.27	6 86	.0061	.0164	.0028	.74	2.6
	Longham Reservoir	1.00	6 85	.0112	.0238	.0048	.76	2.0
	Ipswich River at pumping station . . . .	.83	11.00	.0095	.0220	.0073	.71	4.7
Shelburne(Shelburne Falls Fire District)	Fox Brook . . . .	.01	6 85	.0003	.0040	.0001	.09	3.9
Southbridge	Hatchet Brook Reservoir No. 3 . . . .	.12	2 98	.0012	.0103	.0019	.13	0.7
	Hatchet Brook Reservoir No. 4 . . . .	.18	2 91	.0022	.0122	.0023	.13	0.8
South Hadley (Fire District No. 1)	Leaping Well Reservoir . . . .	.11	3 19	.0020	.0095	.0024	.16	0.9
	Buttery Brook Reservoir . . . .	.15	4 02	.0021	.0112	.0038	.26	1.5
Spencer	Shaw Pond . . . .	.04	2 87	.0024	.0118	.0017	.16	1.1
SPRINGFIELD	Westfield Little River, filtered . . . .	.13	3 93	.0007	.0067	-	.12	1.4
Stockbridge	Lake Averie . . . .	.05	8 35	.0061	.0170	.0034	.13	6.3
Stoughton	Muddy Pond Brook . . . .	.35	4 40	.0027	.0115	.0028	.31	1.2
TAUNTON	Assawompsett Pond . . . .	.33	3 64	.0038	.0136	.0015	.39	0.8
	Elder's Pond . . . .	.13	3 31	.0025	.0131	.0024	.39	0.6
Wakefield	Crystal Lake . . . .	.16	6 38	.0101	.0172	.0022	.70	2.3
Wareham (Onset)	Jonathan Pond . . . .	.00	3 03	.0017	.0088	.0015	.61	0.4
Wayland	Snae Brook Reservoir . . . .	.53	5 24	.0034	.0176	.0018	.29	1.9
WESTFIELD	Montgomery Reservoir . . . .	.29	3 14	.0042	.0189	.0072	.11	0.6
	Tillotson Brook Reservoir . . . .	.06	3 29	.0034	.0060	.0009	.13	0.9
West Springfield	Bear Hole Brook . . . .	.06	7 36	.0025	.0082	.0019	.18	4.7
	Bear Hole Brook, filtered . . . .	.00	7 46	.0006	.0032	-	.15	4.5
Weymouth	Great Pond . . . .	.54	3 55	.0009	.0117	.0020	.36	1.5
Williamsburg	Reservoir . . . .	.11	4 98	.0005	.0089	.0023	.16	2.0
Winchester	North Reservoir . . . .	.02	3 85	.0030	.0130	.0017	.34	1.9
	South Reservoir . . . .	.03	3 62	.0032	.0103	.0012	.31	1.6
	Middle Reservoir . . . .	.07	3 38	.0048	.0170	.0042	.30	1.4
WORCESTER	Bottomly Reservoir . . . .	.24	4 50	.0047	.0227	.0082	.17	1.5
	Kent Reservoir . . . .	.21	4 52	.0017	.0168	.0025	.18	1.5
	Leicester Reservoir . . . .	.21	4 03	.0018	.0154	.0043	.17	1.5
	Mann Reservoir . . . .	.15	4 20	.0015	.0153	.0030	.15	1.4
	Upper Holden Reservoir . . . .	.09	3 02	.0027	.0116	.0022	.15	0.9
	Lower Holden Reservoir . . . .	.05	3 08	.0028	.0123	.0019	.16	1.0
	Kendall Reservoir . . . .	.19	4 45	.0190	.0188	.0047	.19	1.5

Averages of Chemical Analyses of Ground-water Sources for the Year 1923.

[Parts in 100,000.]

CITY OR TOWN.	Source.	Color.	Residue on Evaporation.	AMMONIA.		Chlorine.	NITROGEN AS —		Hardness.	Iron.
				Free.	Albuminoid.		Nitrates.	Nitrites.		
Acton (West and South Water Supply District)	Tubular wells	.00	8.70	.0002	.0019	.45	.0617	.0000	3.4	.004
Adams (Fire District)	Tubular wells	.00	13.65	.0001	.0003	.11	.0390	.0000	12.2	.004
Amesbury	Tubular wells	.35	13.94	.0066	.0037	.45	.0067	.0001	7.1	.293
Ashland	Tubular wells, old supply	.00	5.80	.0004	.0039	.71	.0060	.0000	2.4	.043
	Tubular wells, new supply	.00	5.51	.0007	.0033	.39	.0041	.0000	2.2	.008
ATTLEBORO	Wells	.00	5.13	.0005	.0032	.41	.0100	.0000	2.3	.007
Auburn	Tubular wells	.00	8.12	.0002	.0008	.59	.1900	.0000	3.7	.006
Avon	Wells	.00	6.90	.0006	.0025	.47	.0886	.0000	2.6	.005
Ayer	Large well	.00	7.27	.0006	.0025	.44	.0707	.0000	3.3	.011
	Tubular wells	.00	6.83	.0020	.0017	.31	.0120	.0000	3.4	.021
Barnstable	Tubular wells	.00	4.20	.0010	.0012	.99	.0040	.0000	1.0	.016
Bedford	Large well	.01	4.42	.0003	.0032	.32	.0038	.0000	1.6	.014
Billerica	Old wells	.25	8.02	.0009	.0058	.50	.0284	.0004	2.8	.253
	New wells	.16	11.22	.0016	.0055	.37	.0100	.0001	3.4	.072
Braintree	Filter-gallery	.00	12.98	.0052	.0055	1.17	.2223	.0007	4.3	.013
Bridgewater	Wells	.00	5.27	.0004	.0017	.63	.0392	.0000	1.6	.019
Brookline	Tubular wells and filter-gallery, filtered	.03	9.40	.0007	.0049	.71	.0260	.0000	4.4	.006
Canton	Springdale well	.00	4.93	.0003	.0025	.39	.0077	.0000	1.8	.006
	Well near Henry's Spring	.01	5.13	.0003	.0025	.44	.0220	.0000	1.9	.010
Chelmsford (North Chelmsford Fire District)	Tubular wells	.09	6.12	.0133	.0067	.46	.0600	.0003	2.3	.019
Chelmsford (Water District)	Tubular wells	.00	8.38	.0005	.0018	.60	.1267	.0005	3.5	.006
CHICOPEE (Fairview)	Tubular wells	.01	6.59	.0010	.0023	.28	.0496	.0000	2.1	.173
Cohasset	Tubular wells	.04	14.25	.0005	.0049	1.79	.1674	.0000	5.6	.012
	Dug well, filtered	.03	8.34	.0049	.0066	1.07	.0064	.0000	3.1	.015
Dedham	Large well and tubular wells	.02	10.90	.0023	.0044	.98	.1357	.0001	4.3	.018
Deerfield (Fire District)	Wells	.00	5.15	.0008	.0014	.14	.0000	.0000	2.6	.003
Douglas	Tubular wells	.00	6.07	.0002	.0017	.38	.0652	.0000	2.0	.024
Dracont (Water Supply District)	Tubular wells	.00	11.12	.0008	.0030	.70	.1125	.0000	4.9	.022
Dracont (Collinsville)	Tubular wells	.01	5.47	.0004	.0036	.26	.0102	.0000	2.2	.020
Dudley	Tubular wells	.00	3.20	.0000	.0011	.21	.0075	.0000	1.4	.008
Duxbury (Fire and Water District)	Tubular wells	.00	5.30	.0004	.0012	.81	.0160	.0000	1.0	.003
East Brookfield	Tubular wells	.00	3.17	.0005	.0022	.18	.0058	.0000	0.9	.008
Easthampton	Tubular wells	.00	7.73	.0003	.0010	.15	.0203	.0000	3.9	.004
Easton (North Easton Village District)	Well	.00	6.49	.0006	.0025	.49	.0578	.0000	2.1	.009
Edgartown	Large well	.00	3.65	.0002	.0011	.90	.0030	.0000	1.5	.003
Fairhaven	Tubular wells	.16	8.51	.0008	.0065	.95	.0388	.0000	3.3	.008
Foxborough (Water Supply District)	Tubular wells	.00	5.00	.0000	.0014	.44	.0270	.0001	2.5	.012
Framingham	Filter-gallery	.00	13.78	.0152	.0046	2.14	.0187	.0034	6.0	.013
Franklin	Tubular wells	.00	5.27	.0001	.0019	.53	.0230	.0001	2.0	.008
Grafton	Filter-gallery	.06	12.22	.0005	.0047	1.04	.1525	.0000	5.0	.011
Granville	Well	.00	4.10	.0000	.0012	.07	.0020	.0000	1.0	.001
Greenfield	Well near Green River	.00	7.10	.0005	.0021	.07	.0060	.0000	4.2	.011
Groton	Large well	.00	7.22	.0007	.0028	.21	.0040	.0000	3.6	.013
Groton (West Groton Water Supply District)	Tubular wells	.00	4.87	.0003	.0019	.17	.0145	.0001	3.0	.038
Hingham	Wells	.09	4.88	.0012	.0073	.57	.0098	.0000	1.6	.030
Holliston	Large well	.27	4.91	.0023	.0131	.33	.0037	.0000	1.6	.029
Hopkinton	Tubular wells	.01	10.93	.0003	.0025	.81	.2100	.0000	4.9	.025
Kingston	Tubular wells	.00	4.93	.0006	.0019	.67	.0080	.0000	1.2	.008
Leicester (Water Supply District)	Wells	.00	6.35	.0008	.0015	.21	.0180	.0000	2.1	.010
Leicester (Cherry Valley and Rockdale Water District)	Wells	.24	5.57	.0029	.0160	.24	.0050	.0001	1.9	.012
Littleton	Tubular wells	.00	4.40	.0004	.0010	.19	.0210	.0000	1.8	.006
LOWELL	Boulevard wells (tubular)	.48	7.08	.0328	.0057	.38	.0185	.0001	2.6	.242
	Boulevard wells, filtered	.07	6.13	.0005	.0041	.44	.0288	.0000	2.4	.017
Manchester	Wells	.00	11.74	.0005	.0015	1.89	.1420	.0000	4.3	.010

Averages of Chemical Analyses of Ground-water Sources, etc. — Concluded.

[Parts in 100,000.]

CITY OR TOWN.	Source.	Color.	Residue on Evaporation.	AMMONIA.		Chlorine.	NITROGEN AS —		Hardness.	Iron.
				Free.	Albunoid.		Nitrates.	Nitrites.		
Mansfield (Water Supply District)	Large well . . .	.00	4.50	.0003	.0014	.30	.0588	.0000	1.8	.008
Marblehead . . .	Inlet of filter . . .	.02	16.51	.0112	.0049	1.85	.0051	.0001	7.4	.188
	Outlet of filter . . .	.00	16.09	.0003	.0025	1.86	.0056	.0000	7.4	.009
	Well . . .	.00	17.62	.0004	.0024	3.19	.0117	.0000	7.9	.008
Marion . . .	Tubular wells . . .	.00	4.92	.0001	.0015	.62	.0255	.0000	1.4	.006
Marshfield . . .	Tubular wells at Humarock Beach	.00	8.10	.0000	.0014	1.80	.0360	.0000	1.8	.015
	Wells at Brant Rock . . .	.00	28.00	.0048	.0018	10.35	.0860	.0007	7.4	.053
Mattapoisett . . .	Tubular wells . . .	.00	6.34	.0007	.0020	.86	.0585	.0001	2.6	.016
Medfield . . .	Spring . . .	.00	4.43	.0007	.0022	.27	.0040	.0000	1.8	.003
Medway . . .	Wells . . .	.00	6.46	.0014	.0025	.63	.0352	.0000	3.2	.008
Merrimac . . .	Tubular wells . . .	.00	8.35	.0004	.0012	.48	.0240	.0000	3.4	.009
Methuen . . .	Tubular wells at Harris Brook	.31	8.30	.0043	.0086	.42	.0234	.0000	3.5	.067
	Tubular wells at Pine Island . . .	.00	8.23	.0011	.0026	.68	.0913	.0004	3.8	.008
Middleborough (Fire District)	Well . . .	.31	7.00	.0102	.0057	.49	.0235	.0000	2.5	.391
	Filtered water . . .	.06	6.20	.0012	.0034	.51	.0237	.0001	2.1	.019
Millbury . . .	Well . . .	.00	5.03	.0007	.0032	.31	.0250	.0000	2.1	.009
Millis . . .	Spring . . .	.00	11.52	.0003	.0016	.87	.2425	.0000	4.7	.006
Monson . . .	Large well . . .	.11	3.77	.0005	.0036	.17	.0047	.0000	1.2	.007
Natick . . .	Large well . . .	.00	9.90	.0006	.0019	.89	.0393	.0000	5.2	.005
Needham . . .	Wells . . .	.00	7.70	.0003	.0022	.64	.1257	.0001	2.9	.010
	Hicks Spring . . .	.00	9.05	.0001	.0020	.84	.2650	.0000	3.2	.005
NEWBURYPORT . . .	Wells and Artichoke River, filtered . . .	.14	7.23	.0012	.0088	.61	.0249	.0000	3.1	.048
NEWTON . . .	Tubular wells and filter-gallery . . .	.04	7.45	.0014	.0060	.48	.0223	.0001	3.5	.034
North Attleborough	Wells . . .	.01	6.30	.0006	.0020	.46	.0292	.0000	2.9	.022
Northbridge . . .	Tubular wells . . .	.00	3.94	.0004	.0023	.31	.0046	.0000	1.1	.006
Norton . . .	Tubular wells . . .	.00	4.70	.0004	.0015	.33	.0047	.0000	1.5	.008
Norwood . . .	Tubular wells . . .	.08	6.87	.0010	.0031	.47	.0235	.0000	2.9	.039
Oak Bluffs . . .	Springs . . .	.00	4.70	.0000	.0009	.92	.0060	.0000	0.8	.009
Oxford . . .	Tubular wells . . .	.00	5.37	.0002	.0012	.35	.0465	.0001	2.1	.004
Palmer (Bondsville)	Tubular wells . . .	.00	5.33	.0005	.0023	.26	.0203	.0000	2.3	.010
Pepperell . . .	Tubular wells . . .	.00	3.87	.0004	.0021	.19	.0037	.0001	1.7	.003
Provincetown . . .	Tubular wells . . .	.01	35.87	.0003	.0013	15.17	.0032	.0001	12.2	.039
Reading . . .	Filter-gallery . . .	.82	9.37	.0227	.0143	.92	.0101	.0001	2.6	.247
	Filtered water . . .	.30	15.60	.0031	.0078	.83	.0056	.0001	7.2	.070
Salisbury . . .	Well . . .	.18	6.50	.0013	.0061	.44	.0046	.0000	2.7	.024
Scituate . . .	Tubular wells . . .	.00	15.60	.0003	.0016	2.66	.1820	.0000	5.0	.007
Sharon . . .	Well . . .	.00	17.50	.0005	.0018	2.95	.3100	.0000	7.5	.005
	Tubular wells . . .	.00	5.92	.0004	.0022	.53	.0512	.0000	2.2	.008
Sheffield . . .	Spring . . .	.00	3.60	.0004	.0012	.09	.0050	.0000	2.1	.006
Shirley (Shirley Village Water District)	Well . . .	.00	5.15	.0003	.0013	.42	.1225	.0000	1.7	.005
Shrewsbury . . .	Tubular wells . . .	.00	5.42	.0004	.0016	.30	.0276	.0000	1.9	.010
South Hadley (Fire District No. 2) . . .	Large well . . .	.00	3.90	.0005	.0015	.16	.0437	.0000	1.3	.005
Tisbury . . .	Well . . .	.00	4.43	.0005	.0015	.97	.0046	.0000	0.5	.002
Uxbridge . . .	Tubular wells . . .	.00	5.97	.0005	.0018	.44	.0650	.0000	2.0	.005
Walpole . . .	Tubular wells . . .	.00	4.75	.0001	.0010	.38	.0280	.0000	1.8	.015
WALTHAM . . .	Old well . . .	.07	9.12	.0052	.0039	.64	.0129	.0000	4.1	.063
	New well . . .	.00	7.66	.0009	.0033	.52	.0167	.0000	3.5	.008
Ware . . .	Wells . . .	.00	7.70	.0005	.0021	.56	.1600	.0000	3.4	.013
Wareham (Fire District)	Tubular wells . . .	.00	3.60	.0005	.0017	.57	.0030	.0000	1.0	.003
Webster . . .	Wells . . .	.02	4.27	.0021	.0042	.28	.0060	.0000	1.9	.020
Wellesley . . .	Tubular wells . . .	.00	10.17	.0005	.0019	.94	.0773	.0000	4.3	.011
	Well at Williams Spring . . .	.00	16.45	.0000	.0013	1.01	.7200	.0000	5.0	.019
	Filter-gallery . . .	.00	10.20	.0005	.0023	.91	.1130	.0000	4.4	.006
Westborough . . .	Filter basin . . .	.02	3.95	.0020	.0085	.23	—	—	1.5	.016
West Brookfield . . .	Tubular wells . . .	.00	5.47	.0005	.0015	.26	.0507	.0000	1.7	.007
Weston . . .	Well at Warren Ave. . .	.27	6.63	.0008	.0080	.36	.0087	.0000	3.1	.011
	Tubular wells at Kendal Green . . .	.00	7.65	.0003	.0015	.55	.0835	.0001	2.9	.002
Winchendon . . .	Old wells . . .	.16	3.90	.0017	.0034	.11	.0080	.0000	1.5	.091
	New wells . . .	.00	3.37	.0002	.0023	.10	.0062	.0000	0.9	.009
WOBURN . . .	Filter-gallery . . .	.01	11.88	.0013	.0064	1.21	.0415	.0001	5.5	.011
Worthington (Fire District)	Springs . . .	.00	2.35	.0012	.0022	.11	.0105	.0000	1.2	.015
Wrentham . . .	Tubular wells . . .	.00	4.03	.0001	.0015	.24	.0167	.0000	1.6	.033

WATER SUPPLY STATISTICS.

All of the 39 cities and 179 of the towns in the State now have a public water supply. Of the 137 towns not having a public water supply there are only 12 towns which have a population by the census of 1920 in excess of 2,500. These towns are as follows:

Tewksbury, population (census of 1920)	4,450
Templeton, " " " "	4,019
Somerset, " " " "	3,520
Westport, " " " "	3,115
Seekonk, " " " "	2,898
¹ Wilbraham, " " " "	2,780
Wilmington, " " " "	2,581
Sutton, " " " "	2,578
Hanover, " " " "	2,575
Dighton, " " " "	2,574
Harvard, " " " "	2,546
Bourne, " " " "	2,530

In forty-two of the towns of the State the water works are owned by private companies. The following table gives the classification by population based on the census of the year 1920 of the towns in which the water works are owned by private water companies.

Town.	Company.	Population, 1920 Census.
Southbridge	Southbridge Water Supply Co.	14,245
Milford	Milford Water Co.	13,471
Dedham	Dedham Water Co.	10,792
Northbridge	Whitin Machine Works	10,174
Bridgewater	Bridgewater Water Co.	8,438
² Ludlow	Ludlow Mfg. Co.	7,470
Fairhaven	Fairhaven Water Co.	7,291
Grafton	Grafton Water Co.	6,887
Millbury	Millbury Water Co.	5,653
Hingham	Hingham Water Co.	5,604
Amherst	Amherst Water Co.	5,550
Barnstable	Barnstable Water Co.	4,836
Lee	Berkshire Water Co.	4,085
Auburn	Auburn Water Co.	3,891
Oxford	Oxford Water Co.	3,820
Williamstown	Williamstown Water Co.	3,707
Westford	Westford Water Co.	3,170
Hardwick	Geo. H. Gilbert Mfg. Co.	3,085
³ Nantucket	Wannacomet Water Co.	2,797
Hopedale	Milford Water Co.	2,777
Holliston	Holliston Water Co.	2,707
Lenox	Lenox Water Co.	2,691
Cohasset	Cohasset Water Co.	2,639
Scituate	Scituate Water Co.	2,534
Norton	Norton Water Co.	2,374
Webster	Webster Water Co.	2,282
Northfield	Northfield Water Co.	1,775
Hull	Hingham Water Co.	1,771
Stockbridge	Stockbridge Water Co.	1,764
Salisbury	Salisbury Water Supply Co.	1,701
Cheshire	Cheshire Water Co.	1,476
Sheffield	Sheffield Water Co.	1,435
Marshfield	Brant Rock Water Co. }	1,379
	Humarock Water Co. }	
Sunderland	Sunderland Water Co.	1,289

¹ About fifty houses in Wilbraham are supplied with water from city of Springfield.

² Part of Ludlow supplied by city of Springfield.

³ Small part of Nantucket supplied by town.

Water Supply Statistics—Continued.

Town.	Company	Population, 1920 Census.
Edgartown	Edgartown Water Co.	1,190
W. Stockbridge	East Mountain Water Co.	1,058
Oak Bluffs	Cottage City Water Co.	1,047
Gill	Riverside Water Co.	879
Ashfield	Ashfield Water Co.	869
Granville	Granville Center Water Co.	655
Egremont	So. Egremont Water Co.	441
Monterey	Monterey Water Co.	282

NOTE. — In addition to the above the village of Griswoldville in the town of Colrain is supplied by the Griswoldville Mfg. Co. There are also several towns, parts of which are supplied by water companies and part by public supplies.

CONSUMPTION OF WATER.

Records of the consumption of water are kept in nearly all cities and towns where water is pumped, and in certain other places where water is supplied by gravity. Venturi meters have been installed to measure the quantity of water used. The consumption of water in various cities and towns from which records could be obtained for the year 1923 is presented in the table which follows. The population shown in this table is an estimate made by adding three-fifths of the increase in population between 1915 and 1920 to the population as determined by the census of the latter year, while in cases where the population decreased from 1915 to 1920, the population for the year 1923 has been assumed to be the same as that of the year 1920.

The average daily consumption of water per person as given in the table has been obtained by dividing the average daily quantity of water used by the estimated total population of the city or town. The per capita consumption estimated in this way is in most cases somewhat less than the actual amount used by the portion of the population supplied, since in most cities and towns the water supply is not available to all of the inhabitants. There are other cases where the consumption of water per person is greatly increased by the large quantities of water used for industrial purposes, and still others where a large population not included in the census uses considerable water, especially during the summer months.

The consumption of water in the year 1923 was on the whole somewhat higher than during the previous year.

The records of water consumption for the various cities and towns are shown in the following table:

Average Daily Consumption of Water in Various Cities and Towns in 1923.

CITY OR TOWN.	Esti- mated Popu- lation.	Gallons.	Gallons per Inhabi- tant.	CITY OR TOWN.	Esti- mated Popu- lation.	Gallons.	Gallons per Inhabi- tant.
Metropolitan Water Dis- trict. ¹	1,236,046	125,245,000	101	Metropolitan Water Dis- trict—con.			
Arlington . .	20,931	1,251,100	60	REVERE . .	31,010	2,255,800	73
Belmont . .	12,350	865,700	70	SOMERVILLE . .	96,833	8,008,500	83
Boston . .	749,633	88,932,800	119	Stoneham . .	8,103	615,200	76
CHELSEA . .	43,184	3,646,100	84	Swampscott . .	8,555	658,500	77
EVERETT . .	41,561	4,309,200	104	Watertown . .	24,422	1,804,300	74
Lexington . .	6,837	440,700	64	Winthrop . .	17,073	950,100	56
MALDEN . .	49,221	2,857,100	58	Acton . .	2,168	147,000	68
MEDFORD . .	44,155	2,563,400	58	Acushnet . .	3,488	56,000	16
MELROSE . .	18,998	1,268,400	67	Adams . .	12,967	1,250,000	96
Milton . .	9,851	452,500	46	Agawam . .	5,304	140,000	26
Nahant . .	1,318	189,900	144	Amesbury . .	10,932	634,000	58
QUINCY . .	52,197	4,175,700	80				

¹ Figures for Metropolitan consumption are exclusive of Newton and are based entirely on meter readings. Records based on pumpage will vary slightly from the above.

*Average Daily Consumption of Water in Various Cities and Towns in 1923 —
Concluded.*

CITY OR TOWN.	Esti- mated Popu- lation.	Gallons.	Gallons per In- hab- itant.	CITY OR TOWN.	Esti- mated Popu- lation.	Gallons.	Gallons per In- hab- itant.
Amherst	5,550	680,000	122	Maynard	7,276	329,000	45
Andover	8,442	911,000	108	Medfield	3,595	79,000	22
Ashburnham	2,012	79,000	39	Medway	3,022	153,000	51
Ashland	2,456	225,000	92	Merrimac	2,216	121,000	55
Athol	9,798	1,154,000	118	Methuen	15,898	1,005,000	63
ATTLEBORO	20,481	1,079,000	53	Middleborough	8,453	452,000	53
Auburn	1	7,000	—	Milford and Hopedale	16,248	918,000	56
Avon	2,183	122,000	56	Millbury	5,868	413,000	70
Ayer	3,216	243,000	76	Millis	1,511	62,000	41
Barnstable	4,836	205,000	42	Nantucket ¹	2,797	330,000	118
Bedford	1,362	59,000	43	Natick	10,907	675,000	62
BEVERLY	22,561	1,571,000	70	Needham	7,294	486,000	67
Billerica	3,886	274,000	70	NEW BEDFORD	128,206	10,738,000	84
Braintree	11,322	871,000	77	NEWMURYPORT	15,802	1,426,000	90
BROCKTON	68,634	3,259,000	47	NEWTON	47,819	4,001,000	84
Brookline	40,303	3,805,000	94	North Andover	6,450	443,000	69
CAMBRIDGE	110,217	11,968,000	109	North Attleborough	9,238	594,000	64
Chelmsford	5,982	147,000	25	Northbridge	10,726	869,000	81
Clinton	12,979	1,064,000	82	North Brookfield	2,610	413,000	158
Concord	6,461	717,000	111	Norton	2,374	158,000	67
Danvers and Middle- ton	12,303	1,540,000	125	Norwood	13,617	1,088,000	80
Dartmouth	7,191	90,000	13	Oak Bluffs	1,047	189,000	181
Dedham	10,792	905,000	84	Orange	5,401	160,000	30
Dracut	6,035	126,000	21	PEABODY	20,108	4,467,000	222
Dudley	3,701	205,000	55	Pepperell	2,468	165,000	67
Duxbury	1,553	118,000	76	PITTSFIELD	43,057	5,964,000	139
East Bridgewater	3,486	136,000	39	Plainville	1,365	81,700 ²	60
East Brookfield	—	27,000	—	Plymouth	13,116	1,441,000	110
Easthampton	12,111	835,000 ³	69	Provincetown	4,246	316,000	74
East Longmeadow	2,600	41,000	16	Randolph and Hol- brook	8,058	640,000	79
Easton	5,041	244,000	48	Reading	7,819	304,000	39
Edgartown	1,190	113,000	95	Rockport	3,878	368,000	95
Fairhaven	7,899	494,000	63	SALEM	45,726	5,290,000	116
FALL RIVER	120,485	7,041,000	58	Salisbury	1,701	155,000	91
Falmouth	3,500	477,000	136	Saugus	11,263	590,000	52
FITCHBURG	41,853	4,473,000	107	Scituate	2,534	413,000	163
Foxborough	4,365	361,000	83	Sharon	2,467	235,000	95
Framingham	17,737	1,284,000	72	Shirley	2,266	80,000	35
Franklin	6,531	431,000	66	Shrewsbury	4,256	163,000	38
Gardner	17,328	793,000	46	Southbridge	14,262	929,000	65
GLOUCESTER	22,947	1,754,000	76	SPRINGFIELD	145,600	13,330,000	92
Grafton	7,269	145,000	20	Stockbridge	1,764	194,000	110
Greenfield	17,168	1,492,000	87	TAUNTON	37,723	3,645,000	97
Groton	2,185	116,000	53	Tisbury	1,275	181,000	142
Groveland	2,814	48,000	17	Uxbridge	5,662	523,000	92
HAVERHILL	56,544	5,676,000	100	Wakefield	13,171	735,000	56
Holliston	2,707	128,000	47	Walpole	5,446	832,000	153
HOLYOKE	60,203	7,673,000	127	WALTHAM	31,372	2,134,000	68
Ipswich	6,201	441,000	71	Ware	8,525	459,000	54
Lancaster	2,461	106,000	43	Wareham	4,415	212,000	48
LAWRENCE	96,676	4,780,000	49	Webster	13,674	752,000	55
Lenox	2,691	300,000	111	Wellesley	6,224	637,000	102
Lincoln	1,042	246,000	236	West Brookfield	1,281	45,000	35
Littleton	1,306	42,000	32	WESTFIELD	18,720	2,349,000	125
LOWELL	115,628	6,756,000	58	Westford	3,366	152,000	45
Ludlow	8,201	211,000	26	Weston	2,282	151,000	66
LYNN	101,155	8,017,000	79	West Stockbridge	—	4,000	—
Manchester	2,466	348,000	141	Westwood	1,358	24,000 ³	18
Mansfield	6,545	550,000	84	Weymouth	15,710	1,139,000	73
Marblehead	7,324	629,000	86	Whitman	7,147	304,000	43
Marion	1,288	118,000	92	WOBRUN	16,672	2,450,000	147
MARLBOROUGH	15,028	722,000	48	WORCESTER	189,988	16,381,000	86
Marshfield	1,379	65,000 ⁴	47	Wrentham	3,044	90,000	30
Mattapoisett	1,277	91,000	71				

¹ Small population supplied.² Population not known.³ Estimated.⁴ Average for 9 months.⁵ Does not include supply at Siasconset.⁶ Average for 11 months.

RAINFALL.

The rainfall for the year in the State as a whole was somewhat below the normal as shown in the following table. In the Berkshires it exceeded the average by some 2 inches, and in the high lands in the central parts of the State the excess amounted to about an inch, diminishing towards the northeast to about the normal in the lower Merrimack valley. In the southeastern portion of the State, including also the easterly part of Norfolk county, and small areas in southeastern Middlesex, the rainfall was below the average, the deficiencies ranging from $\frac{1}{2}$ an inch or thereabouts in the north to over 4 inches at stations in the extreme south and on Cape Cod, the average deficiency in this region being about 2.5 inches.

The most marked deficiencies were found in two comparatively small areas, one along the Connecticut River, where the deficiency amounted to nearly 5 inches at Turners Falls, Amherst and Springfield, and the other in the extreme northeastern part of the State, extending from Boston, Cambridge and Waltham northeasterly to the lower Ipswich valley, in which the deficiency was between 4 and 8 inches, the greatest deficiency at any point being 7.95 inches at Wenham Lake.

The seasonal distribution of the rainfall was quite different from that which has obtained continuously for many years. There was a marked excess of precipitation in the months of January and April, and also in October, November and December. There was a considerable deficiency in February, and the rainfall for March was slightly below the average, while the precipitation in the remaining months of the year—May to September, inclusive—was continuously below the normal, the deficiencies being slight in the months of June and July and greatest in May, August and September. The result of this distribution of the rainfall was to produce a short but serious drouth in a large part of the State in the late summer and early autumn. About one-third of the rainfall for the year occurred in $2\frac{1}{2}$ months, between the middle of October and the end of December.

The following table shows the normal rainfall, the rainfall for the year 1923, and the excess or deficiency of the precipitation in each month as compared with the normal.

MONTH.	Normal Rainfall (Inches).	Rainfall in 1923 (Inches).	Excess or Deficiency in 1923 (Inches).	MONTH.	Normal Rainfall (Inches).	Rainfall in 1923 (Inches).	Excess or Deficiency in 1923 (Inches).
January . . .	3.80	6.70	+2.90	August . . .	4.16	2.36	-1.80
February . . .	3.66	1.93	-1.73	September . . .	3.44	1.52	-1.92
March . . .	3.97	3.27	-0.70	October . . .	3.68	4.57	+0.89
April . . .	3.68	5.25	+1.57	November . . .	3.88	4.46	+0.58
May . . .	3.62	1.52	-2.10	December . . .	3.71	5.05	+1.34
June . . .	3.31	3.10	-0.21				
July . . .	3.75	2.84	-0.91	Totals . . .	44.66	42.57	-2.09

FLOW OF STREAMS.

Sudbury River.

The average yield of the Sudbury River during 1923 was 1,114,000 gallons per day per square mile of drainage area or about 14 per cent more than the normal yield for the past 49 years. The yield was above the normal during the months of January, March, April, May, October, November and December, and less than the normal in the other five months of the year. The greatest excess occurred in the month of December and the greatest deficiency in the month of February. The average yield for the six driest months, June to November inclusive, was 307,000 gallons per day per square mile, which is about 19½ per cent below the average yield for the driest six months during the past 49 years, but two to three times as great as the yield in dry years.

In order to show the relation between the yield of the Sudbury River during each month of the year 1923 and the normal yield of that stream as deduced from observations during 49 years, from 1875 to 1923 inclusive, the following table has been prepared. The drainage area of the Sudbury River above the point of measurement is 75.2 square miles.

Table showing the Average Daily Yield of the Sudbury River for Each Month in the Year 1923, in Cubic Feet per Second per Square Mile of Drainage Area, and in Million Gallons per Day per Square Mile of Drainage Area; also, Departure from the Normal.

MONTH.	NORMAL YIELD.		ACTUAL YIELD IN 1923.		EXCESS OR DEFICIENCY.	
	Cubic Feet per Second.	Million Gallons per Day.	Cubic Feet per Second.	Million Gallons per Day.	Cubic Feet per Second.	Million Gallons per Day.
	Per sq. mile	Per sq. mile	Per sq. mile	Per sq. mile	Per sq. mile	Per sq. mile
January . . .	1.743	1.127	2.410	1.558	+0.667	+0.431
February . . .	2.438	1.576	1.447	0.935	-0.991	-0.641
March . . .	4.237	2.739	4.908	3.172	+0.671	+0.433
April . . .	3.065	1.981	3.767	2.435	+0.702	+0.454
May . . .	1.722	1.113	1.821	1.177	+0.099	+0.064
June . . .	0.806	0.521	0.599	0.387	-0.207	-0.134
July . . .	0.324	0.209	0.103	0.067	-0.221	-0.142
August . . .	0.340	0.220	-0.112	-0.073	-0.452	-0.293
September . . .	0.351	0.227	-0.089	-0.057	-0.440	-0.284
October . . .	0.596	0.385	0.614	0.397	+0.018	+0.012
November . . .	1.133	0.733	1.764	1.140	+0.631	+0.407
December . . .	1.492	0.964	3.400	2.198	+1.908	+1.234
Average for whole year . . .	1.516	0.980	1.724	1.114	+0.208	+0.134

The following table gives the rainfall upon the Sudbury River watershed and the total yield expressed in inches in depth upon the watershed (inches of rainfall collected) for each of the past six years, from 1918 to 1923, inclusive, together with the average for a period of forty-nine years, from 1875 to 1923:

Rainfall, in Inches, received and collected on the Sudbury River Drainage Area.

MONTH.	1918.			1919.			1920.			1921.		
	Rain-fall.	Rain-fall collected.	Per Cent collected.	Rain-fall.	Rain-fall collected.	Per Cent collected.	Rain-fall.	Rain-fall collected.	Per Cent collected.	Rain-fall.	Rain-fall collected.	Per Cent collected.
January	3.47	.486	14.0	3.52	2.329	66.1	3.26	.556	17.1	2.78	1.742	62.7
February	3.58	2.914	81.3	3.40	1.477	43.4	6.49	1.239	19.1	4.10	1.361	33.2
March	2.50	3.896	156.2	4.79	4.916	102.7	4.45	9.262	207.9	2.72	4.050	148.8
April	4.43	2.530	57.1	2.93	2.957	101.0	5.19	5.017	96.6	5.30	1.973	37.2
May	1.16	1.141	98.8	4.60	2.301	50.0	3.45	3.292	95.6	3.23	2.957	91.6
June	3.65	.319	8.7	1.86	.193	10.4	6.67	2.929	43.9	3.82	.295	7.7
July	4.07	.171	4.2	5.47	.533	9.8	2.04	.506	24.9	6.86	1.822	26.6
August	1.61	-.096	-6.0	3.75	.164	4.4	1.78	-.070	-4.0	1.20	.105	8.7
September	8.60	1.100	12.8	5.28	1.232	23.3	3.53	.110	3.1	1.88	-.099	-5.3
October	1.04	.490	47.0	2.16	.498	23.1	1.01	-.046	-4.6	1.12	-.175	-15.6
November	2.75	.843	30.7	5.90	2.202	37.3	5.68	1.154	20.3	7.95	1.152	14.5
December	3.68	1.673	45.5	1.98	1.952	98.6	5.11	2.141	41.9	2.54	1.367	53.8
Totals and averages	40.54	15.467	38.2	45.64	20.754	45.5	48.66	26.090	53.6	43.50	16.550	38.0

*Rainfall, in Inches, received and collected on the Sudbury River Drainage Area—
Concluded.*

MONTH.	1922.			1923.			MEAN FOR FORTY-NINE YEARS, 1875-1923.		
	Rain-fall.	Rain-fall collected.	Per Cent collected.	Rain-fall.	Rain-fall collected.	Per Cent collected.	Rain-fall.	Rain-fall collected.	Per Cent collected.
January	1.89	.577	30.5	7.64	2.779	36.4	4.02	2.011	50.0
February	3.25	1.316	40.5	2.31	1.507	65.3	4.09	2.559	62.5
March	5.35	4.587	85.7	3.25	5.659	173.9	4.30	4.887	113.6
April	1.63	3.371	207.1	5.35	4.197	78.4	3.61	3.420	94.7
May	5.39	3.126	58.0	1.01	2.099	207.3	3.30	1.985	60.2
June	8.90	2.695	30.3	4.12	0.668	16.2	3.30	0.899	27.2
July	3.21	1.287	40.1	2.94	0.118	4.0	3.68	0.374	10.1
August	4.85	.627	12.9	2.17	-.130	-6.0	3.75	0.393	10.5
September	4.09	1.135	27.7	1.54	-.099	-6.5	3.36	0.391	11.6
October	2.28	.486	21.3	5.71	0.707	12.4	3.63	0.687	18.9
November	1.34	.639	47.8	5.83	1.969	33.8	3.82	1.265	33.1
December	3.42	.730	21.4	4.96	3.921	79.1	3.78	1.721	45.7
Totals and averages	45.60	20.576	45.1	46.83	23.895	50.0	44.64	20.592	46.1

The following table gives the record of the yield of the Sudbury River watershed for each of the past six years and the mean for forty-nine years, the yield being expressed in gallons per day per square mile of watershed:

Yield of the Sudbury River Drainage Area in Gallons per Day per Square Mile.¹

MONTH.	1918.	1919.	1920.	1921.	1922.	1923.	Mean for Forty-nine Years, 1875-1923.
January	273,000	1,306,000	312,000	976,000	323,000	1,558,000	1,127,000
February	1,809,000	917,000	743,000	845,000	817,000	935,000	1,576,000
March	2,187,000	2,759,000	5,192,000	2,270,000	2,571,000	3,172,000	2,739,000
April	1,466,000	1,713,000	2,911,000	1,144,000	1,956,000	2,435,000	1,981,000
May	639,000	1,290,000	1,846,000	1,658,000	1,753,000	1,177,000	1,113,000
June	185,000	112,000	1,696,000	171,000	1,561,000	387,000	521,000
July	96,000	299,000	284,000	1,021,000	722,000	67,000	209,000
August	-54,000	92,000	-39,000	59,000	351,000	-73,000	220,000
September	637,000	713,000	64,000	-58,000	657,000	-57,000	227,000
October	274,000	279,000	-26,000	-98,000	272,000	397,000	385,000
November	489,000	1,275,000	669,000	667,000	370,000	1,140,000	733,000
December	938,000	1,095,000	1,200,000	766,000	409,000	2,198,000	964,000
Average for whole year	736,000	988,000	1,239,000	788,000	980,000	1,114,000	980,000
Average for driest six months	269,000	458,000	360,000	294,000	463,000	307,000	381,000

¹ The drainage area of the Sudbury River used in making up these records included water surfaces amounting to about 2 per cent of the whole area from 1875 to 1878, inclusive, subsequently increasing by the construction of storage reservoirs to about 3 per cent in 1879, to 3.5 per cent in 1885, to 4 per cent in 1894, and to 6.5 per cent in 1898. The drainage area also contains extensive areas of swampy land, which, though covered with water at times, are not included in the above percentages of water surfaces.

Nashua River.

The average yield of the South Branch of the Nashua River at the outlet of the Wachusett Reservoir, Clinton, during the year 1923 was 1,207,000 gallons per day per square mile or about 10 per cent in excess of the normal for the past 27 years. The yield in the months of January, March, April, November and December was in excess of the normal, the greatest excess occurring in the month of April. The greatest deficiency occurred in the month of February and deficiencies also occurred in the months of June, July, August and September, while the yield for the months of May and October were practically normal. The average yield for the six driest months, June to November inclusive, was 424,000 gallons per day per square mile, or about 24 per cent below the normal yield for that period during the past 27 years, though more than twice as great as the flow in dry seasons. Nevertheless the lowering of Wachusett Reservoir during the past year was greater than for many years.

The following table shows the relation between the yield of the Nashua River during each month of the year 1923 and the normal yield of that stream as deduced from observations during the past 27 years, that is from 1897 to 1923 inclusive. The drainage area of the Nashua River above the point of measurement was 119 square miles from 1897 to 1907, and 118.19 square miles from 1908 to 1913 inclusive. Since January 1, 1914, the city of Worcester has been diverting water from 9.35 square miles of this area for the supply of that city, leaving the net drainage area above the Wachusett dam 108.84 square miles. In the calculations of yield, allowance has been made for the water overflowing from the Worcester area.

Table showing the Average Daily Yield of the South Branch of the Nashua River for Each Month in the Year 1923, in Cubic Feet per Second per Square Mile of Drainage Area, and in Million Gallons per Day per Square Mile of Drainage Area; also, Departure from the Normal.

MONTH.	NORMAL YIELD.		ACTUAL YIELD IN 1923.		EXCESS OR DEFICIENCY.	
	Cubic Feet per Second per Square Mile.	Million Gallons per Day per Square Mile.	Cubic Feet per Second per Square Mile.	Million Gallons per Day per Square Mile.	Cubic Feet per Second per Square Mile.	Million Gallons per Day per Square Mile.
January	1.814	1.173	2.729	1.764	+ .915	+ .591
February	2.047	1.323	1.553	1.004	- .494	- .319
March	4.174	2.698	4.751	3.071	+ .577	+ .373
April	3.385	2.188	4.707	3.042	+ 1.322	+ .854
May	2.038	1.317	2.029	1.311	- .009	- .006
June	1.308	0.845	0.952	0.615	- .356	- .230
July	0.771	0.498	0.459	0.297	- .312	- .201
August	0.626	0.404	0.229	0.148	- .397	- .256
September	0.549	0.355	0.142	0.092	- .407	- .263
October	0.718	0.464	0.665	0.430	- .053	- .034
November	1.200	0.776	1.507	0.974	+ .307	+ .198
December	1.817	1.174	2.656	1.717	+ .839	+ .543
Average for whole year	1.702	1.100	1.867	1.207	+ .165	+ .107

The following table gives the rainfall upon the Nashua River watershed and the total yield expressed in inches in depth upon the watershed (inches of rainfall collected) for each of the past six years, from 1918 to 1923, inclusive, together with the average for the past twenty-seven years:

Rainfall, in Inches, received and collected on the Nashua River Drainage Area.

MONTH.	1918.			1919.			1920.			1921.		
	Rain-fall.	Rain-fall collected.	Per Cent collected.	Rain-fall.	Rain-fall collected.	Per Cent collected.	Rain-fall.	Rain-fall collected.	Per Cent collected.	Rain-fall.	Rain-fall collected.	Per Cent collected.
January	2.97	.864	29.1	3.23	2.392	74.1	3.17	1.153	36.4	2.67	2.521	94.3
February	4.25	3.260	76.6	3.51	1.279	36.5	6.26	1.210	19.3	4.07	1.719	42.2
March	2.24	4.614	206.0	5.27	5.621	106.7	4.26	8.356	196.0	2.87	4.477	156.1
April	3.47	2.775	80.0	2.57	2.954	115.0	6.13	6.031	98.4	6.51	3.329	51.1
May	1.07	1.201	112.8	6.06	3.931	64.9	4.01	3.695	92.1	3.01	3.695	123.0
June	4.57	.902	19.8	2.01	.798	39.6	6.07	3.317	54.6	3.75	.828	22.1
July	2.80	.499	17.8	5.00	.713	14.3	4.33	1.443	33.3	6.41	1.821	28.4
August	2.82	.284	10.1	4.17	.467	11.2	2.91	.584	20.1	1.94	.438	22.6
September	7.18	1.041	14.5	6.78	1.887	27.8	6.39	.931	14.6	2.35	.197	8.4
October	1.58	.609	38.6	2.35	.884	37.6	.63	.731	116.1	2.00	.282	14.1
November	3.08	1.004	32.6	6.01	3.168	52.7	5.49	2.246	40.9	7.31	1.366	18.7
December	3.74	1.884	50.4	2.09	2.305	110.4	6.01	4.619	76.9	2.77	2.271	82.1
Totals and averages	39.77	18.937	47.6	49.05	26.399	53.8	55.66	34.316	61.7	45.66	22.944	50.3

*Rainfall, in Inches, received and collected on the Nashua River Drainage Area—
Concluded.*

MONTH.	1922.			1923.			MEAN FOR TWENTY-SEVEN YEARS 1897-1923.		
	Rain- fall.	Rain- fall col- lected.	Per Cent col- lected.	Rain- fall.	Rain- fall col- lected.	Per Cent col- lected.	Rain- fall.	Rain- fall col- lected.	Per Cent col- lected.
January	2.40	1.058	44.0	7.95	3.146	39.6	3.67	2.092	57.0
February	3.77	1.624	43.0	2.30	1.617	70.5	3.83	2.146	56.0
March	6.21	5.960	96.0	3.29	5.478	166.3	4.10	4.813	117.5
April	2.19	4.108	187.6	5.52	5.244	95.0	3.87	3.777	97.6
May	4.78	3.511	73.5	1.44	2.339	162.1	3.39	2.350	69.4
June	9.22	3.838	41.6	3.51	1.062	30.3	3.97	1.458	36.7
July	4.91	2.672	54.5	3.72	.529	14.2	4.19	.889	21.2
August	5.59	1.419	25.4	2.04	.264	12.9	3.99	.722	18.1
September	2.77	.891	32.2	1.04	.159	15.3	3.64	.613	16.8
October	2.41	.774	32.1	5.16	.766	14.9	3.22	.828	25.7
November	1.59	.912	57.3	5.87	1.682	28.7	3.64	1.340	36.8
December	4.02	.987	24.5	5.07	3.062	60.4	4.05	2.095	51.7
Totals and averages	49.86	27.754	55.7	46.91	25.348	54.0	45.56	23.123	50.8

The following table gives a record of the yield of the Nashua River for each of the past six years and the mean for the past twenty-seven years, the yield being expressed in gallons per day per square mile of watershed:

Yield of the Nashua River Drainage Area in Gallons per Day per Square Mile.¹

MONTH.	1918.	1919.	1920.	1921.	1922.	1923.	Mean for Twenty- seven Years, 1897-1923.
January	484,000	1,341,000	646,000	1,413,000	593,000	1,764,000	1,173,000
February	2,024,000	794,000	725,000	1,067,000	1,008,000	1,004,000	1,323,000
March	2,590,000	3,155,000	4,685,000	2,510,000	3,341,000	3,071,000	2,698,000
April	1,608,000	1,711,000	3,498,000	1,931,000	2,383,000	3,042,000	2,188,000
May	673,000	2,204,000	2,071,000	2,071,000	1,968,000	1,311,000	1,317,000
June	523,000	462,000	1,922,000	450,000	2,223,000	615,000	845,000
July	280,000	400,000	809,000	1,021,000	1,498,000	297,000	498,000
August	159,000	262,000	327,000	246,000	795,000	148,000	404,000
September	603,000	1,093,000	540,000	114,000	516,000	92,000	355,000
October	341,000	495,000	409,000	158,000	434,000	430,000	464,000
November	582,000	1,835,000	1,301,000	791,000	528,000	974,000	776,000
December	1,056,000	1,292,000	2,590,000	1,273,000	553,000	1,717,000	1,174,000
Average for whole year	902,000	1,257,000	1,629,000	1,092,000	1,321,000	1,207,000	1,100,000
Average for driest six months	412,000	752,000	870,000	468,000	723,000	424,000	556,000

Merrimack River.

The flow of the Merrimack River has been measured for many years at Lawrence, above which city the river has a total drainage area of 4,663 square miles which includes 118² square miles tributary to the south branch of the Nashua River, 75 square miles on the Sudbury River, and 18 square miles tributary to Lake Cochituate, or a combined area of 211 square miles from which water is drawn at the present time for the supply of the Metropolitan Water District. The flow as measured at Lawrence includes the water wasted from these drainage areas, the aggregate quantity of which in the wet months of the year is considerable, but which becomes very small in the dry months. Records of the quantity of water wasted from the Sudbury and Nashua River reservoirs have been kept by the Metropolitan District Commission, and its predecessors, and these quantities have been deducted from the flow of the Merrimack River as measured at Lawrence. In presenting the record of the flow of the river, these three drainage areas have been deducted so that the net drainage area above Lawrence was 4,567 square miles in 1880, 4,570 square miles in the years 1881 to 1897, inclusive, and 4,452 square miles since that latter year.

The average flow of the Merrimack River during the year 1923 amounted to 1.471 cubic feet per second, or 951,000 gallons per day, per square mile of drainage

¹ The drainage area used in making up these records included water surfaces amounting to 2.2 per cent of the whole area from 1897 to 1902, inclusive, to 2.4 per cent in 1903, to 3.6 per cent in 1904, to 4.1 per cent in 1905, to 5.1 per cent in 1906, to 6 per cent in 1907, to 7 per cent in 1908, 1909 and 1910, to 6.5 per cent in 1911, to 6.8 per cent in 1912, to 7 per cent in 1913, to 7.4 per cent in 1914 and 1915, to 7.6 per cent in 1916, to 7.4 per cent in 1917 and 1918, and 7.5 per cent in 1919, 1920, 1921, 1922, and 1923.

² Including 9.35 square miles from which water is drawn for the supply of the city of Worcester.

area, or about the normal flow for the past 44 years for which records are available. The flow was in excess of the normal in the months of April, May, November and December, and less than the normal in the other eight months of the year.

In order to show the relation between the flow of this stream during each month of the year 1923 and the normal flow as deduced from observations during 44 years, from 1880 to 1923, inclusive, the following table has been prepared.

Table showing the Average Monthly Flow of the Merrimack River at Lawrence for the Year 1923, in Cubic Feet per Second per Square Mile of Drainage Area; also, Departure from the Normal Flow.

MONTH.	Normal Flow, 1880-1923.	Actual Flow in 1923.	Excess or Deficiency.
January	1.262	1.074	— .188
February	1.350	.855	— .495
March	2.776	1.956	— .820
April	3.507	4.958	+1.451
May	2.243	2.904	+ .661
June	1.278	.730	— .548
July . . . . .	.772	.434	— .338
August . . . . .	.657	.394	— .263
September . . . . .	.641	.303	— .338
October . . . . .	.796	.491	— .305
November	1.105	1.177	+ .072
December	1.285	2.372	+1.087
Average for whole year	1.473	1.471	— .002

The following table gives the record of the flow of the Merrimack River at Lawrence for each of the past six years and the mean for forty-four years, the flow being expressed in cubic feet per second per square mile of drainage area:

Flow of the Merrimack River at Lawrence in Cubic Feet per Second per Square Mile.

MONTH.	1918.	1919.	1920.	1921.	1922.	1923.	Mean for Forty-four Years, 1880-1923.
January . . . . .	.466	1.314	.570	1.679	.830	1.074	1.262
February . . . . .	.819	.872	.618	.995	.887	.855	1.350
March	1.983	3.383	4.082	3.689	3.900	1.956	2.776
April	3.337	2.542	6.002	2.700	4.903	4.958	3.507
May	1.540	2.741	3.545	1.957	2.887	2.904	2.243
June . . . . .	.757	1.007	1.607	.597	3.006	.730	1.278
July . . . . .	.553	.539	.746	1.031	2.111	.434	.772
August . . . . .	.470	.401	.678	.683	.773	.394	.657
September . . . . .	.847	.653	.680	.425	.766	.303	.641
October . . . . .	.991	.699	1.051	.475	.660	.491	.796
November	1.126	1.643	.921	1.057	.612	1.177	1.105
December	1.492	1.331	3.258	1.652	.498	2.372	1.285
Average for whole year	1.198	1.427	1.980	1.412	1.819	1.471	1.473
Average for driest six months . . . . .	.791	.825	.947	.711	.903	.588	.875

Sudbury, Nashua and Merrimack Rivers.

The following table shows the weekly fluctuations during the year 1923 in the yield of the Sudbury River at Framingham and the South Branch of the Nashua River at the outlet of the Wachusett Reservoir, Clinton, and the flow of the Merrimack River at Lawrence. The flow of these streams, particularly that of the Sudbury River and of the South Branch of the Nashua River, serves to indicate the flow of other streams in eastern Massachusetts. The area of the Sudbury River watershed is 75.2 square miles, of the South Branch of the Nashua River 118.19 square miles, and of the Merrimack River 4,452 square miles.

Table showing the Average Weekly Flow of the Sudbury, South Branch of the Nashua and the Merrimack Rivers for the Year 1923, in Cubic Feet per Second per Square Mile of Drainage Area.

WEEK ENDING SUNDAY —	Yield of Sudbury River.	Yield of South Branch, Nashua River.	Flow of Merrimack River.	WEEK ENDING SUNDAY —	Yield of Sudbury River.	Yield of South Branch, Nashua River.	Flow of Merrimack River.
Jan. 7 . . .	2.529	3.679	1.174	July 1 . . .	.500	.722	.508
14 . . .	1.618	1.981	.967	8 . . .	.350	.507	.452
21 . . .	1.054	1.968	.844	15 . . .	— .064	.303	.376
28 . . .	4.272	3.590	1.264	22 . . .	— .133	.415	.431
Feb. 4 . . .	2.553	2.003	1.062	29 . . .	.243	.610	.462
11 . . .	1.513	1.752	.903	Aug. 5 . . .	.141	.412	.529
18 . . .	1.436	1.656	.825	12 . . .	.008	.253	.381
25 . . .	1.015	1.115	.776	19 . . .	— .372	.054	.398
Mar. 4 . . .	1.083	1.577	.773	26 . . .	— .294	.052	.336
11 . . .	2.128	2.197	1.012	Sept. 2 . . .	.098	.409	.354
18 . . .	4.333	4.866	1.083	9 . . .	— .096	.068	.279
25 . . .	9.535	8.687	2.761	16 . . .	— .247	— .006	.318
Apr. 1 . . .	5.610	4.599	3.743	23 . . .	— .090	.240	.290
8 . . .	5.778	7.930	5.610	30 . . .	.063	.303	.340
15 . . .	3.073	3.600	6.363	Oct. 7 . . .	— .262	— .028	.371
22 . . .	2.219	2.444	3.285	14 . . .	— .086	.117	.264
29 . . .	2.515	4.161	4.281	21 . . .	.230	.582	.352
May 6 . . .	5.381	4.825	7.208	28 . . .	2.226	1.914	.817
13 . . .	1.891	2.156	2.571	Nov. 4 . . .	.853	.550	.677
20 . . .	1.477	1.702	2.055	11 . . .	.452	.448	.644
27 . . .	1.205	1.610	1.740	18 . . .	.385	.340	.571
June 3 . . .	.402	.662	.979	25 . . .	3.111	3.335	.780
10 . . .	1.224	1.956	.892	Dec. 2 . . .	4.139	2.973	3.702
17 . . .	.636	.632	.813	9 . . .	5.246	4.157	3.848
24 . . .	— .026	.526	.608	16 . . .	3.552	2.408	2.438
				23 . . .	2.080	1.813	1.433
				30 . . .	2.850	2.275	1.638

EXAMINATION OF RIVERS.

Aberjona River.

Special examinations have been made of the Aberjona River and of the Mystic Lakes during the year 1923, and the results of the analyses of samples of water collected at various points along the course of the river and along the lakes show a marked increase in inorganic pollution but no important increase was noted in the amount of putrescible matters present in the river water. All of the samples of water from the river and the lakes were found to have a reddish color, due largely to the discharge into the river of certain wastes and drainage from a chemical works in North Woburn. In addition to this discoloration, the river in places has been partially covered at times with an unsightly scum. Such conditions as these, however, in the opinion of the Attorney-General, do not constitute a violation of the provisions of Chapter 291 of the Acts of the year 1911 in the absence of certain other causes of complaint.

In the latter part of the year a petition with numerous signatures was presented to the Department asking for an investigation of the condition of the river, and this matter was under consideration at the end of the year. Later in the year a conference was held with the mayor and city officials of Woburn and with the manufacturers having plants along the river, who were having difficulty in the satisfactory disposal of their manufacturing wastes. At this conference there was a general agreement that the best practicable plan of relief and the only plan which promises continuously satisfactory results was the extension of a sewer through this part of the Aberjona valley in general accordance with the plan presented to the Legislature by this Department under the provisions of Chapter 34 of the Resolves of the year 1918 and Chapter 14 of the Resolves of the year 1919.¹ It is expected that legislation will be sought by the city of Woburn as a result of this conference to make practicable the construction of the sewerage system so badly needed in this section of that city.

Assabet River.

The Assabet River below Westborough during 1923 has shown evidence of more serious pollution than in any recent year due to the overflow of sewage from the

¹ See House Document 1216 — year 1920.

filter beds at Westborough and at the Grafton State Hospital. Certain recommendations of the Department as to improvements in the system of sewage disposal, both of the town and of the hospital, have not yet been carried out, but the leakage into the Westborough sewerage system has been materially reduced during the year, thus reducing the quantity of sewage requiring disposal.

Below Hudson and Maynard the condition of the stream has been about as in the previous years, and the same is true at its junction with the Sudbury River at Concord.

Blackstone River and Worcester Sewage Disposal Works.

The condition of the Blackstone River has shown at various points throughout its length an increased pollution as compared with previous years, especially in the lower part of its course within the limits of the State in Northbridge, Uxbridge and Millville where its condition was worse than has been observed at any time.

The city of Worcester has continued diligently the construction of its new sewage disposal works, and the expenditures required by the act have been made. Nevertheless, considerable difficulty has been experienced in completing as much of the work as was expected during the year. Chapter 171 of the Special Acts of the year 1919, under which act the new sewage disposal works for the city of Worcester are being constructed, provides that these works shall be completed on or before the first day of April, 1924. Notwithstanding the fact that work has been carried on as diligently as practicable it seems doubtful, unless the weather conditions are very favorable, whether the works will be ready for operation at that date.

Special observations were made by the Department in the latter part of August, 1923, as to the character of sewage and effluent discharged into the Blackstone River and as to the flow of the river and the condition of its banks, bed and waters. Very briefly, the results of this test have shown that the quantity of sewage discharged at the Worcester sewage disposal works was at this time much larger than the quantity of water flowing in the Blackstone River above the works. As compared with a similar test made in September, 1895, the recent test shows that the quantity of sewage has about doubled in the intervening years though it remains of about the same character as it was at the time of the earlier test.

Samples of the river water collected during the recent test showed a considerable increase in the amount of organic and inorganic solids and iron both above and below the sewage disposal works, as compared with 1895. Below Millbury and farther down stream the river was found to be in considerably worse condition than at the time of the earlier test.

The results of analyses of special and regular samples of sewage and effluent from the Worcester sewage disposal works and of the Blackstone River at various points throughout its course follow:

Chemical Examinations of Worcester Sewage.

[Parts in 100,000.]

Number.	Date of Collection, 1923.	APPEARANCE.		RESIDUE ON EVAPORATION.						AMMONIA.			NITROGEN AS		OXYGEN CON-SUMED.		Alkalinity.	Time.			
		Turbidity.	Sediment.	TOTAL RESIDUE.			LOSS ON IGNITION.			Free.	ALBUMINOID.		Chlorine.	Nitrates.	Nitrites.	Unfiltered.			Filtered.		
				Total.	Dissolved.	Suspended.	Total.	Dissolved.	Suspended.		Total.	Dissolved.								Suspended.	
171856	Aug. 28	dist.	heavy black	130.00	92.40	37.60	60.40	25.60	34.80	1.7200	.6920	.2960	3.960	-	-	9.80	4.40	13.16	3.50	2 P.M. — 7 P.M.	
171862	Aug. 28-29	dist.	heavy black	77.60	51.60	26.00	31.20	12.80	18.40	2.6000	.5520	.1800	.3720	-	-	7.80	3.35	9.72	6.00	8 P.M. — 1 A.M.	
171867	Aug. 29	dist.	v. cons. black	50.00	23.60	26.40	18.40	8.00	10.40	.6720	.3080	.1280	.1800	-	-	3.70	1.90	1.72	3.70	2 A.M. — 7 A.M.	
171872	Aug. 29	great blue black	v. cons. black	123.60	76.00	47.60	65.60	28.00	37.60	2.8000	.8000	.2640	.5360	11.20	-	-	19.20	9.20	4.58	3.20	8 A.M. — 1 P.M.

Raw Sewage.

Filter Effluent.

171860	Aug. 28	v. sl. milky	cons. floc. & iron	73.20	70.40	2.80	22.20	19.80	2.40	1.4400	.0520	-	-	12.10	.6520	.0170	-	-	1.93	1.40	2 P.M. — 7 P.M.
171865	Aug. 28	sl. milky	cons. floc. & iron	66.80	62.40	4.40	13.20	11.20	2.00	1.6000	.0580	-	-	12.20	.6280	.0080	-	-	2.63	0.90	9 P.M. — 1 A.M.
171870	Aug. 29	sl. milky	cons. floc. & iron	71.00	63.60	7.40	19.60	14.20	5.40	1.4000	.0560	-	-	11.20	.5410	.0034	-	-	.86	0.80	2 A.M. — 7 A.M.
171875	Aug. 29	v. sl. milky	cons. floc. & iron	65.60	60.00	5.60	13.60	10.80	2.80	1.4500	.0620	-	-	11.40	.4570	.0026	-	-	2.40	1.80	8 A.M. — 1 P.M.

Chemically Treated Sewage.

171859	Aug. 28	sl. iron.	cons. iron.	66.00	63.20	2.80	15.60	14.00	1.60	2.2000	.1920	.1580	.0340	9.00	.0530	.0060	2.44	2.24	.86	12.80	5.30 P.M. — 7 P.M.
171864	Aug. 28	sl. milky	cons. floc. & iron	82.60	71.40	11.20	24.20	18.60	5.60	2.2000	.2030	.1860	.0170	9.80	.0760	.0080	2.28	2.24	.54	9.40	8 P.M. — 1 A.M.
171869	Aug. 29	dist. iron	v. cons. floc. & iron	66.00	37.60	28.40	20.00	10.00	10.00	.7200	.3040	.1360	.1680	4.30	.0630	.0036	3.00	1.60	1.62	11.70	2 A.M. — 7 A.M. ¹
171874	Aug. 29	sl. milky	v. cons. floc. & iron	63.90	52.40	11.50	17.20	12.40	4.80	1.8000	.1800	.1540	.0260	7.40	.0740	.0100	3.32	2.80	.38	10.90	8 A.M. — 1 P.M.

¹ By-pass opened from 3 A.M. to 4.45 A.M., August 29; chemically treated sewage sample contained raw sewage.

Number.	Date of Collection, 1923.	APPEARANCE.		ODOR.		RESIDUE ON EVAPORATION.				AMMONIA.			NITROGEN AS —		OXYGEN CONSUMED.		Alkalinity.	Time.						
		Turbidity.	Sediment.	Color.	Cold.	Hot.	TOTAL RESIDUE.			ALBUMINOD.			Nitrates.	Nitrites.	Unfiltered.	Filtered.								
							Total.	Dissolved.	Suspended.	Total.	Dissolved.	Suspended.							Total.	Dissolved.	Suspended.			
																						Chlorine.		
<i>Above American Steel & Wire Co.</i>																								
171849	Aug. 28	dist. milky	cons. floc.	.25	faint unfl.	—	14.10	12.80	1.30	3.60	2.80	0.80	.0400	.0800	.0300	.0500	1.85	iron	1.0000	0.88	0.64	.54	2.20	2 P.M. — 7 P.M.
171853	Aug. 29	milky	cons. floc.	.30	faint unfl.	—	17.30	12.90	4.40	4.70	2.90	1.80	.0400	.0860	.0360	.0500	1.80	iron	1.0000	1.16	0.68	.43	2.90	8 P.M. — 7 A.M. ²
171850	Aug. 29	milky	cons. earthy	.25	faint unfl.	—	15.60	12.00	3.60	4.00	2.40	1.60	.0400	.0660	.0300	.0360	1.70	iron	1.0006	0.70	0.48	.43	2.10	8 A.M. — 1 P.M.
<i>Millbrook Channel at Mouth.</i>																								
171845	Aug. 28	sl. earthy	v. cons.	—	decid. tarry	—	98.00	79.60	18.40	42.10	26.90	15.20	.3000	.0850	.0550	.0300	4.55	iron	1.0100	17.00	7.00	26.08	-1.10	2 P.M. — 7 P.M.
171851	Aug. 29	dist. earthy	v. cons. earthy	—	strong tarry	—	65.20	41.60	23.60	21.20	10.60	10.60	.4000	.1320	.0480	.0840	4.30	iron	1.0600	8.10	3.52	5.55	1.10	8 P.M. — 7 A.M. ²
171846	Aug. 29	sl. earthy	v. cons. floc. & iron	.05	faint unfl.	—	57.80	44.10	13.70	16.70	12.70	4.00	.1760	.0820	.0250	.0570	2.70	iron	1. —	2.55	1.56	8.01	-3.00	8 A.M. — 1 P.M.
<i>Iron Bridge above Sewage Disposal Works.</i>																								
171847	Aug. 28	sl. milky	cons. floc. & iron	.25	dist. tarry	—	81.50	77.80	3.70	30.00	27.60	2.40	.1760	.0660	.0300	.0270	3.35	iron	1.0090	4.04	2.32	25.85	-2.70	2 P.M. — 7 P.M.
171852	Aug. 29	milky	v. cons. earthy	—	strong tarry	—	57.40	35.30	22.10	16.00	9.50	6.50	.2080	.1400	.0520	.0880	3.10	iron	1.0000	5.60	3.20	6.58	1.50	8 P.M. — 7 A.M. ²
171848	Aug. 29	sl. milky	cons. floc. & iron	.08	dist. musty	—	39.60	32.90	6.70	10.30	5.50	4.80	.1280	.0520	.0240	.0280	2.40	iron	1.0002	1.68	1.20	4.86	0.30	8 A.M. — 1 P.M.
<i>Below Chemical Effluent.</i>																								
171861	Aug. 28	sl. milky	cons. floc. & iron	.01	dist. tarry	—	40.60	37.00	3.60	9.00	7.20	1.80	.4480	.0560	.0310	.0250	3.85	iron	1.0008	1.96	1.76	7.01	0.60	2 P.M. — 7 P.M.
171866	Aug. 28	milky	heavy floc. & iron	.15	tarry decid.	—	65.00	52.00	13.00	12.90	8.70	4.20	1.2200	.1840	.1040	.0800	7.00	iron	1.0160	3.10	2.32	5.32	3.80	8 P.M. — 1 A.M.
171871	Aug. 29	dist.	v. cons. floc. & earthy	—	dist. tarry	—	45.20	28.00	17.20	14.40	8.00	6.40	.5600	.1640	.0780	.0860	3.40	iron	1.0140	3.40	1.48	1.83	7.00	2 A.M. — 7 A.M. ²
171876	Aug. 29	sl. milky	v. cons. floc. & earthy	—	dist. tarry	—	44.30	36.10	8.20	9.40	7.00	2.40	.120	.1320	.0790	.0530	3.60	iron	1.0100	1.80	1.42	2.46	6.90	8 A.M. — 1 P.M.
<i>Millbury — Below Disposal Works.</i>																								
171829	Aug. 29	sl. milky	cons. floc. & iron	.35	dist. tarry	—	39.20	36.00	3.20	8.00	6.90	1.10	.7200	.0500	.0340	.0160	6.20	iron	1.0700	1.08	0.96	2.12	0.80	2 P.M. — 7 P.M.
171827	Aug. 28-29	dist. milky	v. cons. earthy	.25	tarry decid.	—	76.50	43.50	33.00	19.90	6.70	13.20	.8960	.2280	.0660	.1620	6.45	iron	1.0850	2.90	1.72	5.43	6.70	8 P.M. — 7 A.M. ²
171828	Aug. 29	dist.	v. cons. iron	.29	dist. tarry	—	41.50	34.10	7.40	8.50	5.90	2.60	.6400	.1120	.0560	.0560	4.20	iron	1.0400	2.00	1.28	1.20	6.50	8 A.M. — 1 P.M.

¹ Filtered. ² Rain = .70 in. 1.45 A.M. to 4.45 A.M., August 29.

Chemical Examinations of Blackstone River — Continued.

[Parts in 100,000.]

Number.	Date of Collection, 1923.	APPEARANCE.		Odor.		RESIDUE ON EVAPORATION.				AMMONIA.			NITROGEN AS —			Iron Oxide (Fe ₂ O ₃).	Alkalinity.	Time.					
		Turbidity.	Sediment.	Cold.	Hot.	TOTAL RESIDUE.			Free.	ALBUMINOID.		Chlorine.	AS —										
						Total.	Dissolved.	Suspended.		Total.	Dissolved.		Suspended.	Nitrates.	Nitrites.								
																Oxygen Consumed.							
<i>At Sutton.</i>																							
171830	Aug. 28	dist. milky decid.	sl. floc. & iron v. cons.	faint tarry	—	31.00	28.50	2.50	5.90	4.90	1.00	.8200	.0610	.0410	.0200	4.90	1.0200	1.0060	1.04	.092	.80	2.20	3.20 P.M. — 6.25 P.M.
171831	Aug. 28-29	milky	floc. & earthy	dist. tarry	—	44.20	32.70	11.50	10.10	5.40	4.70	.6240	.1540	.0450	.1090	5.20	1.0200	1.0140	2.30	1.12	4.12	2.30	8.20 P.M. — 7.35 A.M. ²
171832	Aug. 29	decid. red floc.	v. cons. floc. & earthy	dist. tarry	—	35.80	22.50	13.30	9.60	4.80	4.80	.4640	.1760	.0520	.1240	3.40	1.0240	.0090	3.30	1.28	2.40	5.00	11 A.M. — 4 P.M.
<i>At Rockdale.</i>																							
171841	Aug. 28	sl. milky	floc. & iron sl.	faint unpl.	—	29.10	29.10	0.0	4.90	4.90	0.0	.8200	.0640	.0380	.0260	5.10	1.0100	1.0090	0.60	0.46	.33	2.10	4 P.M. — 6 P.M.
171842	Aug. 28-29	sl. milky	floc. & iron sl.	faint unpl.	—	26.60	25.70	0.90	5.90	5.00	0.90	.8000	.0500	.0360	.0140	4.60	1.0160	1.0120	0.48	0.46	.15	1.90	9 P.M. — 7.20 A.M. ²
171843	Aug. 29	milky	floc. & iron sl.	faint unpl.	—	25.90	25.60	0.30	4.00	3.80	0.20	.8000	.0420	.0400	.0020	4.70	1.0100	1.0100	0.40	0.36	.28	2.50	11 A.M. — 3.50 P.M.
<i>Blackstone River at Uxbridge.</i>																							
171837	Aug. 28	v. sl. milky	v. sl.	faint veg.	—	26.50	26.40	0.10	5.00	4.90	0.10	.5200	.0280	.0250	.0030	4.70	1.0900	1.0200	0.36	0.30	.07	1.60	4.30 P.M. — 5.45 P.M.
171836	Aug. 29	v. sl. milky	v. sl.	faint unpl.	—	29.10	26.40	2.70	5.90	4.70	1.20	.4500	.0290	.0195	.0095	4.50	1.0780	1.0170	0.44	0.40	.06	1.50	—
171838	Aug. 29	v. sl. milky	v. sl.	sl. veg.	—	28.30	27.70	0.60	4.70	4.20	0.50	.5500	.0320	.0210	.0110	4.80	1.0660	1.0130	0.40	0.36	.05	1.40	12.05 P.M. — 3.20 P.M.
<i>Blackstone River at Milville.</i>																							
171833	Aug. 28	v. sl. milky	sl. earthy	v. faint unpl.	—	10.20	9.00	1.20	3.10	2.40	.70	.0448	.0236	.0180	.0056	1.50	1.0280	1.0020	0.40	0.30	.13	2.00	5.25 P.M.
171834	Aug. 28-29	v. sl. milky	floc. & iron sl.	faint unpl.	—	9.90	9.80	.10	2.90	2.80	.10	.0384	.0232	.0216	.0016	1.50	1.0280	1.0015	0.36	0.32	.10	1.80	10.30 P.M. — 6.25 A.M.
171835	Aug. 29	v. sl. milky	v. sl. floc.	v. faint unpl.	—	11.60	11.50	.10	3.10	3.00	.10	.0896	.0228	.0192	.0036	1.95	1.0480	1.0036	0.40	0.36	.13	1.70	12.55 P.M.

¹ Filtered. ² Rain = .70 in. 1.45 A.M. to 4.45 A.M., August 29.

Charles River.

The Charles River in the upper portion of its course has been more seriously polluted during the past year than at any time since sewage disposal works were first constructed for the towns in the upper part of the valley. This condition is due to several causes, chiefly to the overflow of unpurified sewage from the Milford sewerage system.

The condition of Mine Brook below the Franklin sewage filters has also been somewhat more objectionable than in any recent year.

The pollution discharged into the stream has had a marked effect upon its condition in the lower portion of its course, and in the dry weather in the late summer and early autumn great numbers of organisms appeared in the river below Dedham.

Chicopee River.

The construction of new filter beds at Spencer has effected an improvement in the condition of the upper waters of the Quaboag River, one of the main tributaries of the Chicopee. The samples of the Ware River in Hardwick have shown a slight increase in pollution as compared to the last few years, and this increase has been noticeable from that point to the mouth of the stream. The condition of the river at Wheelwright was a cause of complaint early in the summer. The Chicopee River below the confluence of the Quaboag, Ware and Swift rivers has shown no material change in condition during the past year.

Concord and Sudbury Rivers.

The Sudbury River below Saxonville has shown evidence of rather more serious pollution than in any recent year, due chiefly to the discharge of wastes from mills in that village and partly to the overflow of sewage from the sewage disposal works of the town of Framingham into one of the tributaries of the river above Saxonville. During the year, a sewerage system has been constructed in the village of Saxonville which is designed to remove also the wastes from the mills at this point. At the mouth, this stream has been in somewhat better condition than in recent years. The Concord River below Concord has shown no change, though at Lowell the river is badly polluted and was the cause of considerable complaint during the latter portion of the year.

Connecticut River.

The condition of the Connecticut River has shown little change in its upper waters, although below Springfield there has been a slight increase in pollution during the year.

The Mill River below Northampton has shown more evidence of pollution than at any time since observations of its condition were begun, due to the discharge of sewage from the city of Northampton directly into the river.

The Manhan River which receives sewage from Easthampton has also shown more evidence of pollution at its mouth than in any recent year.

Deerfield River.

Complaint was made late in the year relative to the pollution of the Deerfield River at points in the upper portion of its course in Massachusetts, and a special examination of this river was made which shows that the pollution is due in part to the discharge of certain wastes from the manufacture of pulp at a mill in the State of Vermont and in part to the discharge of waste from a paper mill a short distance below the State line. The Department has been informed that the operation of the pulp mill in Vermont is to be discontinued during the coming year.

French River.

The results of the analyses of samples of water from the French River below the town of Webster have shown additional evidence of pollution, and in response to a complaint a special examination of this stream was made early in the year which showed that the offensive condition was due largely to the discharge of sewage from sewers of the town of Webster.

Plans for a sewage disposal system for the town of Webster were approved by the Department in 1899, but the works have never been constructed, and the Department sent a communication to the Board of Sewer Commissioners of Webster under date of March 8, 1923, from which the following is quoted:

"In the opinion of the Department, the sewage should be removed from the river without further delay in order to prevent a great nuisance in this stream below the town and injury to the rights of the inhabitants of the valley. The construction of the necessary disposal works should be delayed no longer than may be necessary for the selection of another location for filters, if it should be deemed desirable to change the plan from that already approved."

No definite progress appears to have been made by the town of Webster in the matter of preventing the great nuisance which is caused by the discharge of the sewage of the town untreated directly into this river.

Hoosick River.

The condition of this river below North Adams and down to the State line has been more offensive than in any recent year, a condition which is due to the discharge of sewage into the stream chiefly from the city of North Adams. The Department has repeatedly recommended the construction of works for the treatment of the sewage from this municipality but no action has been taken thereon.

Housatonic River.

Samples of water collected from the Housatonic River below Pittsfield have shown more evidence of pollution than in any year since the observations of the condition of this river were begun many years ago. An inspection of the stream shows that large quantities of sewage overflow at times from the sewage pumping station of the city of Pittsfield, and that the river also receives sewage from other towns, as well as large quantities of manufacturing wastes. The river will inevitably soon become a nuisance unless a remedy for these conditions is provided.

Merrimack River.

A special investigation has been made of this stream and its tributaries during the year in connection with the provisions of Chapter 49 of the Resolves of 1923 directing the Department to prepare plans for the disposal of the sewage of the cities and towns in this valley, and the results of this investigation will be presented in a special report. Briefly, the examinations have shown that the condition of the river throughout its course in Massachusetts is more objectionable than in earlier years.

Millers River.

The condition of Millers River below Gardner shows more evidence of pollution than in any recent year, a condition due chiefly to the falling off in efficiency of the Gardner sewage disposal works occurring at the same time as a rather low flow in the streams. Below Athol and below Orange also the condition of the stream was less satisfactory than in earlier years.

Nashua River.

The North Branch of the Nashua River above the sewage disposal works of the city of Fitchburg has been more objectionable than in any year since those works were constructed, and the same is true of its condition below the city of Leominster and throughout the remainder of its course to its confluence with the South Branch. The improvement effected by the treatment of the sewage of the city of Fitchburg at the disposal works has now been largely offset by increasing pollution from manufacturing in Fitchburg and especially by the increasing quantities of untreated sewage discharged into the river from the city of Leominster.

The South Branch of the Nashua River above the Clinton sewage disposal works has shown more evidence of pollution than in any recent year, while below these works the river water has contained more putrescible organic matter than for many years.

The condition of the main river below the confluence of the two branches has been more objectionable than in any recent year.

The pollution of the north branch of the Nashua River below Fitchburg has resulted in much complaint during the year, and a special investigation of the sources of pollution has been instituted. While this work had not been completed at the end of the year it indicates the necessity for such action by the Legislature as will prevent the discharge of offensive substances into this stream, as was recommended by this Department in its report to the Legislature of 1920, which will be found in House Document No. 873 of that year.

Neponset River.

Examinations of the condition of the Neponset River have shown that in most of its course its condition has been more objectionable than at any time for a number of years. On several occasions oxygen has been absent from the river water at the lower end of the Fowl Meadows, while the waters of Hawes Brook, one of its tributaries, though containing less organic matter than usual has, nevertheless, been in a foul and offensive condition during a considerable part of the year. There is also more evidence of pollution in the upper waters of the river both above and below Hawes Brook than has been the case in recent years.

Taunton River.

The Salisbury Plain River below Brockton and the Matfield River, into which the Salisbury Plain River flows, have shown more evidence of pollution than at any time during the last two or three years. The Coweset River has also shown a marked increase in pollution, and during the past year this stream below the Brockton sewage disposal works has been in a more offensive condition than in any year since the observations of its condition were begun in 1901. An increase in pollution is also noted in the Town River both above and below Bridgewater, due to the effluent from the Brockton sewage disposal works and to the discharge of sewage from Bridgewater. Mill River at its mouth (in Taunton) shows increasing evidence of pollution, and the same is true of the main stream below Taunton and also at Berkeley Bridge.

Other Rivers.

The results of the analyses of samples of water from other rivers, including the Ten Mile and Westfield rivers, have shown in general an increase in pollution as compared with earlier years.

EXAMINATION OF SEWAGE DISPOSAL WORKS.

The new sewer for conveying the sewage of Andover including that of Shawsheen Village to the Merrimack River was practically completed at the end of the year, and the Andover sewage disposal works will shortly be abandoned.

At Brockton the new sewage disposal works consisting of a series of settling tanks and two acres of trickling filters have been in use throughout the year and for several months a very large portion of the sewage has been applied to these filters, thus making it possible to rest the sand filter beds.

At Clinton the usual observations of the operation of the filter beds have been continued and samples of sewage and effluent have been analyzed at regular intervals. A large quantity of sewage has been allowed to overflow during a portion of the year, thus relieving the filters of a considerable load, but some of the beds have been badly clogged during much of the year.

Improvements in the sewage disposal system at Framingham have been under construction during the year which include Imhoff tanks and a considerable additional area of filter beds. The new works were practically completed at the end of the year.

The sewage from the city of Gardner has not been satisfactorily purified during the year, and the percentage of putrescible organic matter removed is one of the lowest of any sand filter plant of the State. An improvement in the means of treating the sewage of Gardner is greatly needed.

At Milford large quantities of sewage have been wasted into the river during the year but additional sewage disposal works are under construction and with their completion should provide means of caring for all of the sewage of the town.

A small addition has been made to the filter beds at Hopedale to keep pace with the extension of the sewerage system to a newly developed section of the town.

Additional filter beds have been constructed also at Norwood and at Spencer, and a considerable improvement has been made at Westborough by work done in the prevention of leakage of ground water into the sewerage system.

At Natick the filter beds have been badly overloaded during the year and have become a serious nuisance, while at Pittsfield the works are inadequate for the treatment of all of the sewage and large quantities are wasted into the Housatonic River.

One of the most seriously objectionable conditions caused by sewage disposal

works is that at Southbridge where putrefying sewage on the surface of the filter beds has been the cause of much complaint. These works are entirely inadequate for the disposal of the sewage of the town, and additional provision for proper treatment should be made at the earliest practicable time.

The average results of analyses of samples of sewage and effluent and statistics concerning the more important sewage disposal works in the State are presented in the following tables:

TABLE No. 1. — *Average Results of the Analyses of Monthly Samples of Sewage as received at the Disposal Works.* (*Fats determined in about 69 Per Cent of the Samples.*)
[Parts in 100,000.]

CITY OR TOWN.	RESIDUE ON EVAPORATION.					AMMONIA.			Chlorine.		OXYGEN CONSUMED.		IRON.		Fats.
	TOTAL RESIDUE.			LOSS ON IGNITION.		Free.	ALBUMINOID.		Unfil-tered.	Fil-tered.	Unfil-tered.	Fil-tered.	Unfil-tered.	Fil-tered.	
	Total.	Dis-solved.	Sus-pended.	Total.	Dis-solved.		Sus-pended.								
Andover ¹	106.03	44.80	61.23	70.74	17.69	53.05	3.68	.80	.42	.38	8.97	4.07	.244	.105	28.62
ARTLEBORO ²	87.23	64.67	22.56	39.20	25.63	13.57	3.76	.67	.27	.40	6.76	2.98	—	—	1.40
BROCKTON ³	77.33	49.20	28.13	43.80	19.20	24.60	5.35	.98	.51	.47	11.33	5.04	.193	.097	10.42
Clinton ³	163.76	82.04	81.72	103.96	41.58	62.38	4.33	1.63	.87	.76	17.75	9.28	.216	.096	3.35
Concord ²	27.70	20.33	7.37	14.93	8.40	6.53	2.56	.45	.23	.22	3.50	1.53	.098	.063	39.37
Easthampton ²	68.37	38.00	30.37	38.33	15.87	22.46	4.22	.80	.33	.47	5.80	3.17	.141	.051	1.61
Fitchburg	56.45	30.38	26.07	34.83	13.32	21.51	2.28	.55	.26	.26	5.27	3.29	.291	.121	1.11
Franklin ³	77.60	46.38	30.72	42.23	17.51	24.72	4.01	1.54	.77	.77	9.17	5.41	.308	.054	3.61
Franklin ²	46.97	33.40	13.57	22.90	13.30	9.60	4.24	.84	.55	.29	6.27	2.52	.139	.065	1.46
Gardner (Gardner Area) ⁴	79.75	56.00	23.75	47.95	27.00	20.95	8.96	1.44	.87	.57	9.22	4.98	.136	.053	2.45
Gardner (Templeton Area)	82.88	42.85	40.03	51.12	16.70	34.42	8.97	1.34	.65	.69	8.18	3.82	.190	.066	2.72
Hopedale ^{1,3}	63.13	41.67	21.46	34.47	17.33	17.14	6.80	.86	.41	.45	10.60	4.27	.177	.079	1.66
Hudson ¹	75.58	41.80	30.69	42.07	16.34	25.73	7.67	1.06	.54	.52	11.12	9.25	.195	.066	2.34
Leicester ⁵	35.67	24.07	11.60	20.00	10.80	9.20	2.03	.50	.25	.25	4.77	2.23	.131	.024	1.15
Marion ¹	33.20	27.86	5.34	12.11	7.49	4.62	1.69	.32	.19	.13	9.17	2.10	.085	.048	—
MALBOROUGH	71.76	45.75	26.01	38.38	19.10	19.28	3.97	.85	.37	.48	9.53	3.35	.186	.083	2.00
Milford ¹	42.90	32.55	10.35	20.60	12.20	8.40	5.14	.58	.30	.28	5.15	3.01	.148	.072	1.23
Natick	53.75	40.58	13.17	22.27	11.80	10.47	2.94	.49	.24	.25	9.85	2.93	.110	.052	1.04
North Attleborough ¹	31.10	23.70	7.40	15.00	9.38	5.62	1.43	.44	.23	.21	3.70	2.81	.108	.066	.80
Northbridge ²	38.53	25.13	13.40	23.40	12.00	11.40	3.81	.76	.45	.31	3.82	2.43	.117	.042	1.94
Norwood	74.96	53.95	21.01	29.23	17.87	11.36	4.08	.85	.38	.47	16.05	3.91	.181	.072	1.67
Pittsfield ⁵	37.03	32.78	4.25	17.65	14.35	3.30	2.38	.43	.25	.18	4.43	3.48	.090	.045	1.81
Southbridge ²	54.83	36.26	18.57	29.53	14.46	15.07	3.63	.62	.27	.35	7.02	5.42	.158	.093	1.35
Spencer ²	40.90	32.23	8.67	18.53	12.30	6.23	1.35	.56	.33	.23	6.12	4.12	.142	.057	1.31
Stockbridge ⁴	37.85	31.10	6.75	20.55	14.25	6.30	2.57	.37	.20	.17	2.52	2.93	.045	.026	.69
Westborough	67.13	52.47	14.66	32.05	20.75	11.30	2.38	.64	.37	.27	11.74	8.06	.129	.069	1.30
WORCESTER (day) ⁷	119.90	76.75	43.15	55.65	21.40	34.25	2.58	.77	.24	.53	12.90	6.03	5.410	1.972	2.16
WORCESTER (night) ⁶	96.70	70.57	26.13	41.73	24.30	17.43	1.61	.50	.19	.31	8.33	4.91	8.260	5.220	1.76

¹ Seven samples. ² Six samples. ³ At pumping station. ⁴ Four samples. ⁵ Three samples. ⁶ Eight samples. ⁷ Five samples.

TABLE No. 2. — *Average Results of the Analyses of Monthly Samples of Sewage as applied to the Filter Beds after Preliminary Treatment as Indicated. (Fats determined in about 69 Per Cent of the Samples.)*
[Parts in 100,000.]

CITY OR TOWN.	Form of Preliminary Treatment.	RESIDUE ON EVAPORATION.					AMMONIA.			Chlorine.		OXYGEN CONSUMED.		IRON.		Kjeldahl Nitrogen.	Fats.
		TOTAL RESIDUE.			LOSS ON IGNITION.		Free.	ALBUMINOID.		Unfiltered.	Filtered.	Unfiltered.	Filtered.	Unfiltered.	Filtered.		
		Total.	Dissolved.	Suspended.	Total.	Dissolved.		Suspended.									
Andover ¹	None	55.09	45.26	9.83	25.46	17.66	3.75	.62	.33	.29	9.96	4.91	3.50	.132	.077	1.95	7.09
ARTLEBORO ²	Tank	87.23	64.67	22.56	39.20	25.63	3.76	.67	.27	.40	6.76	5.63	2.98	—	—	1.40	—
BROCKTON	Tanks	44.30	36.80	7.50	20.37	14.12	4.79	.45	.30	.15	8.60	4.82	3.75	.142	.084	1.09	3.87
Clinton.	Basins	71.14	56.76	14.38	36.48	26.16	2.66	.66	.41	.25	4.70	7.60	6.09	.132	.100	1.36	11.97
Concord ²	None	27.70	20.33	7.37	14.93	8.40	2.56	.45	.23	.22	3.50	2.55	1.53	.098	.063	.93	—
Easthampton ²	Tanks	49.37	34.17	15.20	26.30	14.10	5.26	.61	.28	.33	5.57	5.10	2.75	.104	.051	1.22	—
Fitchburg	Imhoff Tanks	31.50	26.02	5.48	14.37	11.05	2.36	.38	.23	.15	5.24	3.55	2.65	.220	.134	.80	2.62
Framingham	None	77.60	46.88	30.72	42.23	17.51	24.72	4.01	1.54	.77	9.17	17.07	5.41	.308	.065	3.61	33.15
Franklin ²	Tanks	34.80	31.70	3.10	12.77	10.17	2.38	.34	.21	.13	7.00	1.96	1.29	.071	.042	.74	—
Gardner (Gardner Area) ³	None	79.75	56.00	23.75	47.95	27.00	8.96	1.44	.87	.57	9.22	10.82	4.98	.136	.053	2.45	13.31
Gardner (Templeton Area)	Tanks	49.83	42.20	7.63	20.42	14.30	5.75	.56	.34	.22	10.04	4.28	3.10	.151	.093	1.19	5.34
Hopedale ²	Tanks	43.60	31.53	12.07	24.40	14.17	6.28	.69	.37	.32	5.82	4.72	2.85	.217	.082	1.39	—
Hudson	Tanks	55.06	45.05	10.01	23.18	14.97	5.42	.56	.27	.29	11.48	4.80	3.25	.129	.069	1.25	6.80
Leicester ⁴	None	35.67	24.07	11.60	20.00	10.80	2.03	.50	.25	.25	3.17	4.77	2.23	.131	.024	1.15	—
Marion ¹	None	33.20	27.86	5.34	12.11	7.49	1.69	.32	.19	.13	9.17	2.10	1.33	.085	.048	.77	—
MARLBOROUGH	Tanks	56.65	46.90	9.75	26.73	18.47	5.16	.60	.35	.25	9.82	5.51	3.67	.208	.112	1.33	5.17
Milford ³	Tanks	30.30	26.65	3.65	12.00	9.35	2.71	.34	.21	.13	4.45	2.29	1.34	.098	.059	.76	—
Natick	None	53.75	40.58	13.17	22.27	11.80	2.64	.49	.24	.25	9.85	3.76	2.03	.110	.052	1.04	5.45
North Attleborough ²	Tanks	24.80	20.73	4.07	10.10	7.57	1.57	.25	.15	.10	3.74	1.90	1.16	.103	.056	.47	—
Northbridge ²	Tanks	23.63	18.73	4.90	11.63	7.97	2.43	.35	.22	.13	3.03	2.31	1.44	.106	.053	.92	—
Norwood	Tank	57.64	42.53	15.11	23.95	13.09	3.24	.50	.25	.25	11.21	5.67	2.77	.173	.074	1.06	4.72
PRINCETON ⁵	None	37.03	32.78	4.25	17.65	14.35	2.38	.43	.25	.18	4.43	3.48	2.40	.090	.045	.81	3.54
Southbridge ²	Tanks	51.73	39.03	12.70	26.53	16.23	4.53	.60	.29	.31	7.95	4.46	2.52	.181	.092	1.22	4.72
Spencer ²	None	40.90	32.23	8.67	18.53	12.30	1.35	.56	.33	.23	6.12	4.12	2.47	.142	.057	1.31	—
Stockbridge ³	None	37.85	31.10	6.75	20.55	14.25	2.57	.37	.20	.17	2.52	2.93	1.67	.045	.026	.69	—
Westborough.	None	67.13	52.47	14.66	32.05	20.75	2.38	.64	.37	.27	11.74	8.06	5.92	.129	.069	1.30	—
Worcester (day). ⁶	Tanks	119.90	76.75	43.15	55.65	21.40	2.58	.77	.24	.53	12.90	16.08	6.03	5.410	1.972	2.16	—

¹ Seven samples.

² Six samples.

³ Four samples.

⁴ Three samples.

⁵ Eight samples.

⁶ Five samples.

¹ Seven samples. ² Six samples. ³ Four samples. ⁴ Three samples. ⁵ Eight samples. ⁶ Five samples.

TABLE No. 3. — Efficiency of Settling Tank and Other Forms of Preliminary Treatment as Indicated by the Foregoing Tables.
[Parts in 100,000.]

CITY or TOWN	Form of Preliminary Treatment.	SUSPENDED SOLIDS.			TOTAL ALBUMINOID AMMONIA.			OXYGEN CONSUMED.			FATS.			CHLORINE.	
		Raw Sewage.	Settled or Treated Sewage.	Per Cent Re-moval.	Raw Sewage.	Settled or Treated Sewage.	Per Cent Re-moval.	Raw Sewage.	Settled or Treated Sewage.	Per Cent Re-moval.	Raw Sewage.	Settled or Treated Sewage.	Per Cent Re-moval.	Raw Sewage.	Settled or Treated Sewage.
Andover.	Tank	61.23	9.83	84	.80	.62	23	9.97	4.91	51	28.62	7.09	75	8.97	9.96
Brockton.	Tanks	28.13	7.50	73	.98	.45	54	9.22	4.82	48	10.42	3.87	63	11.33	8.60
Clinton.	Basins	81.12	14.38	82	1.63	.66	60	17.75	7.60	57	39.37	11.97	70	5.97	4.70
Easthampton.	Tanks	30.37	15.20	50	.80	.61	24	6.65	5.10	23	—	—	—	5.80	5.57
Frederic.	Inhoff Tanks	26.07	5.48	79	.55	.38	31	5.59	3.55	36	6.30	2.62	58	5.27	5.24
Franklin.	Tanks	13.57	3.10	77	.84	.34	60	4.29	1.96	54	—	—	—	6.27	7.00
Gardner (Templeton Area).	Tanks	40.03	7.63	81	1.34	.56	58	8.90	4.28	52	30.90	5.34	83	8.18	10.04
Hopedale.	Tanks	21.46	12.07	44	.86	.69	20	7.07	4.72	33	—	—	—	10.60	5.82
Hudson.	Tanks	30.69	10.01	67	1.06	.56	47	9.25	4.80	48	10.55	6.80	36	11.12	11.48
Marlborough.	Tanks	26.01	9.75	63	.85	.60	29	7.64	5.51	28	9.67	5.17	47	9.53	9.82
Milford.	Tanks	10.35	3.65	65	.58	.34	41	3.85	2.29	41	—	—	—	5.15	4.45
North Attleborough.	Tanks	7.40	4.07	45	.44	.25	43	2.81	1.90	32	—	—	—	3.70	3.74
Northbridge.	Tanks	13.40	4.90	63	.76	.35	54	4.87	2.31	53	—	—	—	3.82	3.03
Norwood.	Tank	21.01	16.11	28	.85	.50	41	7.69	5.67	26	6.65	4.72	29	16.05	11.21
Southbridge.	Tanks	18.57	12.70	32	.62	.60	3	5.42	4.46	18	4.67	4.72	—	7.02	7.95
WORCESTER.	Chem. Precip.	26.13	9.01	66	.50	.23	54	10.39	2.99	71	—	—	—	8.33	8.00

TABLE No. 4. — *Average Results of the Analysis of Monthly Samples as applied to Trickling Filters at Brockton and Fitchburg and of Their Effluents, Per Cents Removed, etc.*
[Parts in 100,000.]

BROCKTON.

	RESIDUE ON EVAPORATION.						AMMONIA.			Chlorine.		NITROGEN AS —		OXYGEN CONSUMED.		Fats.	Remarks.	
	TOTAL RESIDUE.			LOSS ON IGNITION.			ALBUMINOID.			Nitrates.	Nitrites.	Unfiltered.	Filtered.	Kjeldahl Nitrogen.				
	Total.	Dissolved.	Suspended.	Total.	Dissolved.	Suspended.	Free.	Total.	Dissolved.						Suspended.			
Settled sewage as applied to trickling filter.	44.30	36.80	7.50	20.37	14.12	6.25	4.79	.45	.30	.15	8.60	—	—	4.82	3.75	1.09	3.87	Trickling filter has an area of 2.0 acres and a depth of 10 feet of stone from 1.5 to 3 inches in size.
Effluent from trickling filter.	50.33	40.38	9.95	21.51	13.75	7.76	3.13	.45	.22	.23	8.46	1.2378	.0317	4.65	2.27	.92	2.31	One half of filter used alternately. The average rate of operation was about 874,000 gallons per acre per day.
Per cent removed.	—	—	—	—	3	—	35	—	27	—	8.83	—	—	4	39	16	40	Period of sedimentation averages about 2.5 hours.
Settled effluent from trickling filter.	43.30	38.77	4.53	17.28	13.43	3.85	3.63	.34	.22	.12	—	.8206	.0303	3.70	2.51	.84	1.91	Tanks cleaned forty-eight times.
Per cent removed by tank.	14	4	54	20	2	50	—	24	—	48	—	—	—	20	—	9	17	
Per cent removed by trickling filter and settling tank.	2	—	40	15	5	38	24	24	27	20	—	—	—	23	33	23	51	

FITCHBURG.

Imhoff tank-effluent as applied to trickling filter.	31.50	26.02	5.48	14.37	11.05	3.32	2.36	.38	.23	.15	5.24	—	—	3.55	2.65	.80	2.62	Trickling filter has an area of 2.14 acres and a depth of 10 feet of stone from 1 to 3 inches in size. The average rate of operation was about 1,710,000 gallons per day for area used (1.86 acres).
Effluent from trickling filter.	29.63	27.08	2.55	12.42	10.79	1.63	.56	.17	.10	.07	5.19	1.3216	.0095	1.66	1.05	.48	—	
Per cent removed.	6	—	53	14	2	51	54	55	34	53	—	—	—	53	60	40	—	
Settled effluent from trickling filter as discharged to Nashua River.	28.87	26.79	2.08	12.44	10.96	1.48	.55	.14	.09	.05	5.18	1.3284	.0097	1.35	.99	.42	—	
Per cent removed.	3	1	18	—	—	9	4	11	10	29	—	—	—	19	6	13	—	
Per cent removed by trickling filter and settling tanks.	8	—	62	13	1	55	72	63	61	67	—	—	—	62	63	48	—	

TABLE NO. 5. — *Average Results of Analyses of Monthly Samples of Effluent from Sand Filters.*
[Parts in 100,000.]

CITY OR TOWN.	Free Ammonia.	Total Albuminoid Ammonia.	Chlorine.	NITROGEN AS —		Iron.
				Nitrates.	Nitrites.	
Andover ¹	2.56	.1637	8.62	.1816	.0230	.546
Attleboro ²	.68	.0700	5.26	.9498	.0201	.057
Brockton ¹	3.21	.0593	7.70	.2102	.0020	1.465
Clinton ¹	1.88	.0921	4.22	.1133	.0020	1.983
Concord ³	.05	.0245	4.45	.9966	.0041	.024
Easthampton ³	.09	.0471	4.52	1.1655	.0212	.138
Frammingham ^{1, 3}	2.92	.0951	8.89	.1891	.0109	1.122
Franklin ³	.86	.0540	6.92	2.6808	.1697	.456
Gardner (Gardner Area) ⁴	1.55	.1000	9.65	1.4090	.0278	.268
Gardner (Templeton Area) ¹	2.97	.1951	10.92	1.5218	.0538	.394
Hopedale ^{1, 3}	1.83	.0915	6.39	1.9118	.0072	.127
Hudson	.94	.1014	10.76	1.6575	.0306	.242
Leicester ⁶	1.12	.1030	4.70	.1295	.1254	.350
Marion ⁶	1.09	.0386	3.84	.2693	.0222	.117
Marlborough ¹	.55	.0587	8.01	2.1941	.0379	.043
Milford ²	1.50	.0716	5.62	1.1522	.0330	.187
Natick	2.78	.0495	8.47	.1078	.0014	.739
North Attleborough	.08	.0232	3.62	.6980	.0069	.018
Northbridge ³	.32	.0492	3.17	.9015	.0213	.075
Norwood	1.50	.0735	15.16	.1295	.0204	.723
Pittsfield	.71	.0987	4.25	.6888	.0305	.132
Southbridge	3.38	.0934	7.95	.1227	.0021	1.704
Spencer ³	.67	.0668	4.52	.2698	.0257	.620
Stockbridge ⁶	.18	.0438	3.31	1.1747	.0232	.079
Westborough ¹	1.90	.0685	6.89	.0662	.0040	.782
Worcester ⁶	2.18	.0926	11.21	.7814	.0049	2.092

¹ Regular samples from two or more underdrains in one average.² Five samples.³ Six samples.⁴ Four samples.⁵ Two samples.⁶ Seven samples.TABLE NO. 6. — *Efficiency of Sand Filters (Per Cent of Free and Albuminoid Ammonia removed).*
[Parts in 100,000.]

CITY OR TOWN.	FREE AMMONIA.			TOTAL ALBUMINOID AMMONIA.			CHLORINE.		Rate of Operation with Even Distribution (Gallons per Acre per Day). ¹
	Applied Sewage.	Effluent.	Per Cent Removed.	Applied Sewage.	Effluent.	Per Cent Removed.	Applied Sewage.	Effluent.	
Andover	3.75	2.56	32	.62	.16	4	9.96	8.62	70,000
Attleboro	3.76	.68	32	.6	.07	90	6.76	5.26	44,000
Brockton	4.79	3.21	33	.45	.06	87	8.60	7.70	35,000
Clinton	2.66	1.88	29	.66	.09	86	4.70	4.22	66,000
Concord	2.56	.05	98	.45	.02	96	3.50	4.45	92,000
Easthampton	5.26	.09	98	.61	.05	92	5.57	4.52	—
Frammingham	4.01	2.92	27	1.54	.10	94	9.17	8.89	61,000
Franklin	2.38	.86	64	.34	0	85	7.00	6.92	74,000
Gardner (Gardner Area)	8.96	1.55	83	1.44	.10	93	9.22	9.65	80,000
Gardner (Templeton Area)	5.75	2.97	48	.56	.20	64	10.04	10.92	80,000
Hopedale	6.28	1.83	71	.69	.09	87	5.82	6.39	44,000
Hudson	5.42	.94	83	.56	.10	82	11.48	10.76	61,000
Leicester	2.03	1.12	45	.50	.10	80	3.17	4.70	—
Marion	1.69	1.09	36	.32	.04	88	9.17	3.84	129,000
Marlborough	5.16	.55	89	.60	.06	90	9.82	8.01	51,000
Milford	2.71	1.50	45	.34	.07	79	4.45	5.62	50,000
Natick	2.64	2.78	—	.49	.05	90	9.85	8.47	59,000
North Attleborough	1.57	.08	95	.25	.02	92	3.74	3.62	90,000
Northbridge	2.43	.32	87	.35	.05	86	3.03	3.17	66,000
Norwood	3.24	1.50	54	.50	.07	86	11.21	15.16	85,000
Pittsfield	2.38	.71	70	.43	.10	77	4.43	4.25	75,000
Southbridge	4.53	3.38	25	.60	.09	85	7.95	7.95	121,000
Spencer	1.35	.67	50	.56	.07	88	6.12	4.52	—
Stockbridge	2.57	.18	93	.37	.04	89	2.52	3.31	—
Westborough	2.38	1.90	20	.64	.07	89	11.74	6.89	76,000
Worcester	2.58	2.18	16	.77	.09	88	12.90	11.21	53,000

¹ See also Table No. 7.

TABLE No. 7. — *Extent of Sewerage Works, Rate of Flow, and Rate of Operation of Filters.*

CITY OR TOWN.	Popula- tion, Census of 1920.	Approxi- mate Length of Sanitary Sewers (Miles).	Approxi- mate Number of House Con- nections.	ESTIMATED QUANTITY OF SEWAGE TREATED (GALLONS PER DAY).			Estimated Average Quantity of Sewage per Connection (Gallons per Day).	Net Area of Filter Beds (Acres).	Estimated Rate of Operation with even Dis- tribution (Gallons per Acre per Day).
				Average for Year.	Average for Month of Maximum Flow.	Average for Month of Minimum Flow.			
Andover	8,268	—	—	254,000	336,000	223,000	—	3.65	70,000
ATTLEBORO	19,731	30.88	1,266	683,000	1,108,000	425,000	539	15.50	44,000
BROCKTON	66,254	93.43	7,054	3,157,000 ¹	—	—	448	37.00	38,000
Clinton	12,979	—	—	1,585,000 ²	2,311,000	1,123,000	—	26.23	60,000
Concord	6,461	8.95	497	394,000	618,000	292,000	793	4.28	92,000
Easthampton	11,261	19.95	1,250	—	—	—	—	2.20	—
FITCHBURG	41,029	62.83	—	3,165,000	6,900,000 ³	1,200,000 ⁴	—	—	—
Franklin	17,033	26.85	2,495	1,293,000	2,159,000	823,000	519	21.12	61,000
Gardner	6,497	16.05	697	241,000	352,000	115,000	346	3.24	74,000
Hopedale	2,777	—	—	1,000,000 ⁵	—	—	497	12.50	80,000
Hudson	7,607	11.70	833	167,000	269,000	108,000	—	3.79	44,000
Marion	1,288	3.93	176	552,000	1,147,000	276,000	663	9.00	61,000
MARLBOROUGH	15,028	34.70	2,359	97,000 ²	141,000	44,000	551	.75	129,000
Milford	13,471	18.37	1,409	1,064,000	1,875,000	514,000	451	20.90	51,000
Natick	10,907	16.04	1,476	461,000 ³	624,000	296,000	327	9.30	50,000
North Attleborough	9,238	—	—	744,000	1,466,000	357,000	504	12.60	59,000
Northbridge	10,174	—	—	628,000	822,000	487,000	—	7.00	90,000
Northwood	12,627	20.62	1,410	737,000	978,000	652,000	—	12.00	66,000
PITTSFIELD	41,763	63.49	5,152	897,000	1,161,000	682,000	636	10.54	85,000
Southbridge	14,245	—	—	3,078,000 ³	3,416,000	2,596,000	597	41.15	75,000
Spencer	5,930	—	—	1,031,000 ³	1,245,000	797,000	—	8.50	121,000
Westborough	5,789	—	550	440,000	738,000	237,000	800	9.30	76,000
WORCESTER	179,754	—	—	3,560,000 ⁵	—	—	—	66.80	53,000

¹ Includes an average of 1,409,000 gallons per day to sand filters and 1,748,000 gallons to trickling filters.² Entire quantity of sewage not treated.³ Maximum day.⁴ Minimum day.⁵ Records questionable.⁶ Amount treated by sand filters. Total flow 22,250,000 gallons per day.

TABLE No. 8. — *General Features.* (For data concerning the trickling filters at Brockton and Fitchburg see Table No. 4.)

CITY OR TOWN.	Year of Construction of and Additions to Works.	Depth of Under-drains (Feet).	Distance Apart of Under-drains (Feet).	Filtering Material.	Attention given to Disposal Works.
Andover	1898	4	20	Fair sand, small quantity of gravel; practically all handled in construction.	One man all the time.
ATTLEBORO	1912, 1913	4-7	35	Excellent sand and gravel; found in place . . .	One man all the time; others when necessary.
BROCKTON	1893, 1905, 1908, 1912	5.5	30	Good sand and gravel; found in place . . .	Four men all the time; large force when necessary.
Clinton	1898, 1899	8	60-70	Good sand and gravel; found in place . . .	Two men all the time; others when necessary.
Concord	1899	none	—	Good sand underlain with gravel; found in place . . .	One man once a day.
Easthampton	1908	3.5	20-40	Good sand and gravel; largely found in place . . .	One man all the time; one other when necessary.
Frammingham	1890	4-4.5	30-40	Good sand and gravel	Three or more men in summer; only one in winter.
Franklin	1915	4.5	25	Good sand and gravel	One man every two or three days; others when necessary.
Gardner (Gardner area)	1891	5	20	Good sand; handled in construction . . .	One man all the time; others when necessary.
Gardner (Templeton area)	1901, 1909	3-4	20-30	Coarse sand; handled in construction . . .	One man all the time; more when necessary.
Hopkdale	1900	3	35-60	Some good sand and some rather fine sand . . .	One man all the time.
Hudson	1904, 1910	5-6	50-100	Good sand and gravel; found in place . . .	One man all the time; others when necessary.
Leicester	1894	4	8	Hard, compact sand; found in place . . .	Very little attention.
Marion	1906	5	—	Mostly good sand; pockets of fine sand and some ledge; largely found in place.	One man every day in summer; every other day in winter.
MARLBOROUGH	1891, 1908, 1909, 1910, 1911	4.5-6	30-50	Rather fine sand; found in place . . .	One man all the time; others when necessary.
Milford	1907	5	40	Rather fine sand; found in place . . .	One man every day; others when necessary.
Natick	1896	6	36	Sand of good quality, but strata of very fine sand in places; found in place.	One man all the time; others when necessary.
North Attleborough	1909, 1910	5-6.5	55	Coarse sand and gravel largely found in place . . .	One man every day; others when necessary.
Northbridge	1906, 1907, 1920	4	50-75	Coarse sand and gravel; mostly handled . . .	Two men all the time; others when necessary.
Norwood	1909, 1918	4-6	40	Good sand and gravel; found in place . . .	One man all the time; others when necessary.
Pittsfield	1901, 1915	4	35	Good sand; mostly found in place . . .	Two men all the time; others when necessary.
Southbridge	1903	4	40	Fair sand and gravel; considerable quantity handled, some found in place.	One man once a day.
Spencer	1897	1	—	Good sand and gravel; largely found in place . . .	One man all the time; others when necessary.
Stockbridge	1899	{ 3-4.5	23	Sand filters, good quality sand . . .	One man all the time.
Westborough	1892, 1911	{ 3-4.5	30	Irrigation area, rather fine sand . . .	One man all the time; others when necessary.
WORCESTER	1893 ²	5	30-40	Good sand and gravel; handled in construction . . .	Several men all the time; a large force when necessary.
		4-6	35-50	Good sand and gravel; largely found in place . . .	

¹ Only three beds underdrained.² Year of first construction of sand filters. Many additions.

EXAMINATION OF SEWER OUTLETS DISCHARGING INTO THE SEA.

During the past year a sewer outlet for certain thickly settled sections of the town of Hull discharging into the Weir River or Hingham Bay was constructed and will be ready for operation during the coming season.

A special examination was made in the latter part of the year of the outlet of the sewerage system for the city of Lynn. An investigation to determine the best practicable method of disposing of the sewage of this city was made in 1915 by this Department acting jointly with the authorities of the city of Lynn, and a report with plans for an outlet into the sea was presented to the Legislature of 1916 and printed as Senate Document 450 of 1916. The sewage of the city is now discharged upon the flats adjacent to the water front and the wooden flume by which the sewage was conveyed a short distance from the shore line is no longer in operation. The outlet is located at no great distance from the thickly settled portion of the city and the serious nuisance created by the sewage is a menace to the public health. It is important that suitable action be taken to remove this nuisance at the earliest practicable time.

Investigations have been made during the year under Resolves of 1923, Chapter 64, providing for an investigation of sewerage and sewage disposal for the cities of Salem, Beverly, and Peabody and the town of Danvers and for certain public institutions, and the information relative to this matter will appear in a special document. A special report relative to the condition of the North River and the sewerage of Salem and Peabody was presented to the Legislature of 1922 and printed as House Document 1175 of that year. No changes have been made in the sewer outlets of Peabody and Salem or in that of the city of Beverly during the past year.

Special examinations have been made during the year of the sewer outlets of the North and South Metropolitan sewerage districts and of that of the Boston main drainage system, and very little change has been noted in the conditions surrounding these main sewer outlets. No change of importance has taken place in the conditions about other sewer outlets discharging into tidal estuaries, some of which continue to be highly objectionable. The outlets discharging into deep water continue to operate satisfactorily.

NUISANCES FROM NOISOME TRADES.

During the past year the works of the Massachusetts Oil Refining Company at East Braintree were purchased by the Cities Service Refining Company. Under date of July 23 the Cities Service Refining Company in a communication to the Department described in general terms the methods of operation which the company proposed to follow and stated that the company desired to begin operations on or about August 1. Under date of August 14 the Department sent the following order to the company:

"The Department of Public Health has considered your request for authority to begin the operation of the works for the distillation of oils at East Braintree and on Aug. 13, 1923, examined the works during an experimental run thereof suggested in a communication of the engineer of the Department dated Aug. 3, 1923.

"The information furnished as to the proposed process of operation is to the effect that it is fundamentally different from that which was used by the Massachusetts Oil Refining Company, and consequently there are problems to be worked out as they arise in connection with using the continuous system instead of the batch process and running to fuel oil instead of to coke.

"The Department finds that material improvements have been made at the works, and in view of the further improvements promised and now in process of installation, together with the proposed changes in processes involved, it is probable that, with the installation of proper means of preventing odors before the use of each process is begun, objectionable conditions can be avoided.

"The Department hereby approves the operation of the works in accordance with the following order:

"Ordered that in view of the material improvements that have already been made at the works and the change in method of operation to be used by the Cities Service Refining Company in its operation of the oil refinery plant at East Braintree, Massachusetts, authority of the Department is hereby given to the said

Cities Service Refining Company to operate said plant to the extent outlined in its letter to the Department dated July 23, 1923, until the Department shall by reason of nuisance or for the protection of the public health find it necessary to modify or rescind this order."

The refinery was reopened toward the latter part of August and at the end of the year about 70 per cent of the plant was in operation. Some complaint was made during the period when deposits left by the old company were being removed at the suggestion of this Department but other than this practically no complaint has been made and the observations have not shown offensive conditions.

In connection with the matter of complaint of offensive odors in the vicinity of the refinery of the Beacon Oil Company in Everett the Department sent a communication to the petitioners under date of March 20, 1923, from which the following is quoted:

"As a result of its investigations, the Department finds that there are odors of various kinds arising from the different industrial works and other sources in this neighborhood which are more or less noticeable in the district. The locality in which the works are situated is an industrial district containing many works which are the cause of more or less odor but which works are essential to the needs of the community and should not be discontinued if odors from them can be made unobjectionable.

"The observations of the Department in the region about the works of the Beacon Oil Company do not show that the character and intensity of the odors recognizable therefrom beyond the limits of the refinery property in recent months are of such an objectionable nature as to require that the further carrying on of the business of refining oil at these works should be prevented. In the opinion of the Department, if the devices for preventing odors are properly controlled and operated, the business of refining oil as at present conducted can continue to be carried on in this locality without injury to the public health and comfort. The Department, so far as means allow, will continue the observations of conditions in this locality, the results of which will be available at any time."

Further complaint has since been made relative to this matter and further investigations are now being made.

As a result of its investigations in the vicinity of the refinery of the New England Oil Refining Company in Fall River, the Department sent a communication to the petitioners in Fall River under date of Sept. 22, 1923, from which the following is quoted:

"As a result of its investigations, the Department finds that slight oily odors escape at times from the refinery, more particularly from the various chimneys, which have not been found to be more noticeable or objectionable during these investigations than those discharged from other furnaces in which fuel oil is burned.

"In the opinion of the Department, the business of refining oils at these works can be continued without injury to the public health, comfort and convenience so long as the devices for preventing the escape of odors are properly maintained and controlled."

Early in August the Department received a petition signed by a large number of inhabitants of Provincetown and Truro relative to offensive odors escaping from the plant of the East Harbor Fertilizer Company located in Truro near the Provincetown line, and the Department held a hearing on this matter in Provincetown on Aug. 15, 1923. As a result of this hearing and of observations within the plant and in its vicinity, the Department, under date of Oct. 16, 1923, ordered the company to desist from the further manufacture of fertilizer and oils. This plant is now closed.

IMPROVEMENT OF THE NEPONSET RIVER.

A contract was made in the latter part of 1922 with the William L. Miller Company of Boston for the restoration of certain rights of way in the Fowl Meadows by the construction of two bridges and the work under this contract was completed early in 1923.

The commission appointed by the Supreme Judicial Court in 1921 to determine what proportion of one-half of the expense of the improvement of the Neponset River shall be paid by the city of Boston and the various towns mentioned in

Acts of 1911, Section 655, has held several hearings and taken several views of the lands under consideration. The commission had made no report at the end of the year.

SPECIAL INVESTIGATIONS.

Two special investigations were committed to the Department by the Legislature of 1923; one relative to sewerage and sewage disposal in the Merrimack River Valley and the other to sewerage and sewage disposal of the cities of Salem, Beverly, Peabody and the town of Danvers, and for certain public institutions. Work on these investigations has been carried on since the resolves were passed and the results are presented to the Legislature in separate reports.

During the past year the Division has investigated conditions affecting the water supply and fire protection at the four state sanatoria under the administration of the Department and has advised as to certain requirements necessary to provide these institutions with adequate and effective water works systems. It has been found that the source of water supply at the Lakeville State Sanatorium is not adequate for its requirements and it is important that suitable appropriations be made for an additional supply for this institution.

This Division in accordance with a request from the Department of Public Utilities has assisted that Department under the provision of the General Laws with engineering investigation of the Onset Water Company at Wareham, the White Horse Water Company at Plymouth, and the Bridgewater Water Company at Bridgewater.

Report of the Division of Water and Sewage Laboratories

H. W. Clark, *Director*.

This Division was engaged during the year 1923 in carrying on the necessary analytical and research work called for by the act entitled "An Act to Protect the Purity of the Inland Waters of the State," and also by many special acts concerning water supply, sewerage, sewage disposal, etc., etc. In carrying out the provisions of these acts and to enable the Department to give such advice as was requested during the year by towns, cities, corporations, individuals, etc., concerning water supply, sewerage, sewage disposal, improvement of rivers, questions in regard to the disposal of industrial wastes, etc., 8,620 chemical, 2,069 microscopical and 3,911 bacterial analyses were made in the laboratories of this Division. Many other partial analyses were made as shown in the following table. Practically all of the more than two hundred applications to the Department during the year for advice upon matters relating to water supply, sewerage, etc., necessitated laboratory work by this Division. Studies were made of water supplies, water filters, sewage purification areas, shellfish areas, ice supplies, etc.

The report of this Division simply enumerates the analytical work carried on in the State House laboratories upon samples from water supplies, rivers, sewerage systems, sewage disposal areas, etc., as these analyses are averaged and presented in tables covering twenty or more pages of the report of the Division of Sanitary Engineering. These tables, however, are really a very important portion of the report of this Division.

The following table summarizes the analytical work of the Division:

State House Laboratories.

Samples from public water supplies:	
Surface waters	2,232
Ground waters	1,099
Samples from domestic wells, ice supplies, etc.	379
Samples from rivers	1,123
Samples from sewage disposal works:	
Sewages	377
Effluents	528
Samples of wastes and effluents from factories	140
Samples of sea water from various locations	11
Miscellaneous samples (partial analyses) including 71 lead samples for special investigation	149
	<hr/> 6,038
Microscopical examinations	2,069
Special examinations of water (including field work) for manganese, lead, alkalinity and acidity, dissolved oxygen, carbonic acid, hydrogen ion concentration, etc..	768
Examinations of oils and samples of gas from vicinity of oil refineries, etc.	31
	<hr/> 2,868

Lawrence Experiment Station.

Chemical examinations on account of investigations concerning the disposal of domestic sewage and factory wastes, filtration and other treatments of water supplies, swimming pools, and the investigation of the Merrimack River (Sewerage of the Merrimack River Valley)	2,582
Mechanical and chemical examinations of sands	283
Determinations of dissolved oxygen, carbonic acid, hydrogen ion concentration, etc. (field work)	343
Bacterial examinations of samples of water from public water supplies, rivers, municipal sewage filters, ice supplies and swimming pools	2,291
Bacterial examinations in connection with methods of purification of sewage and water	1,541
Bacterial examinations of shellfish	79
	<hr/> 7,119

Much special work has been done by the Division as follows:

The investigation in regard to sewerage and sewage disposal in the valley of the Merrimack River occupied the time of several members of this force during a considerable portion of the warmer months of the year, as much field work, studies of trade wastes, etc., entering this river and its tributaries were carried on.

A large amount of field work, involving determinations of dissolved oxygen, carbonic acid and bacteria, was done in connection with certain other river investigations and the operation of certain mechanical filter plants, investigations of these latter being made to determine the effect of the effluents from such filters upon metal pipes, etc.

Certain studies were made in order to ascertain the condition of various water filters and sewage areas in the State and approximately three hundred samples of sand were analyzed during this investigation.

The investigation of the method of purifying water devised at the Lawrence Experiment Station several years ago was continued. This method has attracted wide interest and is being studied by various cities in different parts of the country. It apparently can be developed into an ideal and economical method for removing color, organic matter, etc., from soft, highly colored waters without increasing the corrosive properties of such waters.

Special studies were carried on in regard to the newer forms of sewage treatment and purification and small but typical plants illustrating each method of water and sewage purification were kept in operation at the Lawrence Experiment Station.

Work upon hydrogen ion control of different methods of water filtration was continued and as usual the efficiency of the filters supplying filtered water to the city of Lawrence was determined constantly by bacterial tests, and the operation of the liquid chlorine apparatus at these filters observed.

During the year a study was made in collaboration with the Division of Industrial Medicine of the Harvard School of Public Health upon the effect of certain well waters piped through lead upon the health of the users of these waters. This investigation called for many determinations of lead.

Laboratory and field work for the accurate determination of noxious gases given off from oil refineries and chemical works was also done in connection with investigations of nuisances of this character.

Studies of *B. coli*, *B. cloacæ* and *B. aerogenes* were made during the year.

A large part of the work outlined here has been included during the year in reports and statements of the Department to cities, towns, corporations and groups of citizens, and cannot be elaborated here other than in the brief summary presented. Certain work carried on at the Lawrence Experiment Station, however, is summarized briefly in the following pages of this report. It was the custom formerly to give quite fully not only the work summarized but also the results of investigations carried on at the Lawrence Experiment Station. Of late years only a digest has been given. It is necessary, however, to describe some of this work.

STUDIES OF BACTERIA.

It is of the first importance to learn more and more in regard to the significance in water from different sources of bacteria of the colon group, and during the past two years the bacterial laboratory of the Lawrence Experiment Station has made differentiation studies on 919 cultures.

No absolutely definite conclusions have been reached as to the relative meaning of the presence of *B. coli*, *B. aerogenes* or *B. cloacæ* in water but the rule seems to be that in waters which have been comparatively free from the presence of acid-forming bacteria, a sudden appearance of such organisms means almost invariably the presence of true methyl-red, positive *B. coli*. On the other hand, waters which normally show some slight evidence of pollution, especially where acid-formers can be demonstrated only by fishing from confirmation plates made from fermentations of comparatively large amounts of the water, are more likely to show the presence of *B. cloacæ*. This would seem to indicate that this organism is the most resistant in water of the bacteria commonly included under the general name of *B. coli*.

Further evidence of this is furnished by an experiment which has been carried

on at the Station for several years. Pure cultures of *B. coli*, *B. aerogenes* and *B. cloacæ* have been planted in sterile garden soil and kept in the dark at 20° C. Sterile water has been added from time to time to prevent desiccation, but no food other than that in the soil has been added. Of six various strains of *B. coli*, one has died and the others, while retaining their characteristics, have become attenuated, as have the *B. aerogenes*; the cultures of *B. cloacæ*, on the other hand, have flourished strongly.

The acid-producing organisms of the sewage applied to one of the sand filters at the Lawrence Experiment Station are reduced 99.997 per cent by filtration; *B. cloacæ* make up from 2 per cent to 5 per cent of the acid-formers in the sewage applied, while in the effluent 20 per cent to 60 per cent of the acid-formers are *B. cloacæ*.

In several series of examinations of shellfish from beds apparently not directly contaminated by sewage or other pollution high "*B. coli* scores" were found. On differentiation, however, no true *B. coli* were discovered but many *B. cloacæ* and a few *B. aerogenes*. It is rather remarkable that in sea-gull droppings found on these same beds the *B. cloacæ* were also found to the exclusion of other forms of "*B. coli*." However, in the case of a well which seemed to be protected from any pollution, persistent positive fermentations showed no *B. coli* or *B. cloacæ* but many *B. aerogenes*.

These results, while far from definite, seem to show that the presence of *B. coli* indicates recent pollution; *B. aerogenes*, *alone*, no fecal pollution, and *B. cloacæ*, contamination which is very distant or much attenuated.

While it is commonly held that *B. aerogenes* has a normal soil habitat and is mainly present in sewage or polluted waters through being washed in from the soil, there is reason to believe that their much larger proportion in such waters than in feces is due to their growth there rather than from being washed in. In feces the proportion of *B. aerogenes* is about 2 or 3 per cent of the acid-formers; in Lawrence sewage and in the water of the badly polluted Merrimack River it is roughly 50 per cent. In the sewage from the Station water closet, which is diluted with river water and applied to a septic tank, there is no chance of organisms being washed in. *B. aerogenes*, nevertheless, make up 40 per cent of the acid-producing organisms. The acid-formers in the diluting water make up only .02 per cent of the total number.

TREATMENT AND FILTRATION OF WATER.

Mechanical and Sand Filtration.

During the year studies were made on the purification of water by both slow sand and mechanical filtration. These results, however, will be given in connection with this work in some future report.

Hydrogen Ion Control.

As during 1922 the effect of pH or hydrogen ion concentration upon the filtration of water especially in the operation of mechanical filters and of the filters loaded with ferric or aluminum hydroxide was studied. It was found concerning mechanical filtration that with the water being treated a pH of about 6.3 gave the better results. Apparently this factor of pH concentration exerts a similar influence on the operation of the loaded filters. The average pH of the river water applied to these filters during the year was 6.2 and the pH of the effluents when the filters were in good operation, about 6.4 or 6.3, this slight increase being due to the residual alkalinity retained by the hydroxides in the filter in the form of sodium bi-carbonate resulting from the treatment of the filters with caustic soda solutions as described in previous reports and further along in this report; that is, the caustic soda is converted to bicarbonate by the free carbon dioxide in the water. The effect of increasing the pH of the applied water was experimented with especially with Filter No. 530, enough sodium carbonate being added to the water applied to increase the pH from 6.2 to 6.7. It was several days before the increase showed in the effluent from this filter but when it did appear the color removal properties of the filter deteriorated rapidly, the color of the effluent increasing from .06 to .16. The ability of the hydroxides to store and retain almost indefinitely small amounts of alkalinity suggested the idea that after a filter has

been regenerated, that is, treated with a solution of caustic soda and the residual caustic soda practically all washed out, a small application of acid might neutralize the alkalinity retained by the hydroxides and by lowering the pH cause the filter to give better color removal. Preliminary results as shown in the following table indicate that this is true.

Effect of adding Sulphuric Acid per Acre to Applied Water. Results before and eighteen hours after application of the Acid.

FILTER No.	COLOR.		ALKALINITY.		pH.	
	Before.	After.	Before.	After.	Before.	After.
488 . . . . .	.28	.09	1.5	1.0	6.6	6.2
488	—	.02	—	0.07	—	6.1
494 . . . . .	.21	.04	1.3	0.5	6.8	5.9
512 . . . . .	.15	.04	1.4	1.0	7.2	6.6
514 . . . . .	.08	.02	1.7	0.8	7.2	6.4
528 . . . . .	.16	.05	1.1	0.5	6.1	5.9
533 . . . . .	.11	.02	1.7	1.2	7.0	6.3
Canal water . . . . .	.34	—	0.7	—	5.9	—

OPERATION OF SLOW SAND FILTERS LOADED WITH FERRIC OR ALUMINUM HYDROXIDE.

The principal objections to the method of slow sand filtration as applied to colored waters is that this method seldom removes from the comparatively clear but often highly-colored waters of New England more than from 25 to 30 per cent of this coloring matter and hence does not produce as attractive an effluent as desired at the present time. On account of this, the method devised at Lawrence several years ago for the purification of water by filtration through loaded filters has received much attention and promises to develop into an ideal method of treatment for these soft highly-colored waters as it produces an effluent low in color, clear and practically non-corrosive that is, no more corrosive than the water before filtration. When constructed of sand of the grade commonly used in slow sand filtration—that is, with an effective size of 0.25 or 0.30 millimeter—and operated at rates approximating 5,000,000 gallons per acre daily, they remove for periods of from five to eight weeks from 60 to 75 per cent of the coloring matter of the applied water, and when constructed of fine sand—that is, sand with an effective size of from 0.12 to 0.15 millimeter—they will often remove more than 90 per cent of this coloring matter for periods of from four to six months.

The operation of such filters was begun at the Station in 1917. The process has been described in previous reports but, briefly, consists in precipitating in the interstices of the filter and on the sand grains, ferric or aluminum hydroxide. It has been found by experimental work that the most perfect way of precipitating this hydroxide is to mix sufficient magnesium oxide in the sand to precipitate the desired amount of aluminum or ferric sulphate and then pass the sulphate in dilute solution through the filter. While the use of solutions of soda ash as the alkali has been fairly successful with small filters, stratification of hydroxide layers is apt to occur in the filters when this method is used, hence all filters at the Station are now loaded with the use of magnesite or magnesium oxide as just described. The hydroxides precipitated in the filter by this method have the property of removing color and other organic matter from water. After a time this absorptive power decreases and it is necessary to regenerate the hydroxide by dissolving out the absorbed or stored organic coloring matter by treatment with caustic soda solutions.

At the present time there are seventeen filters of this kind in operation at the Station. Of these, one (No. 488) in which ferric hydroxide was precipitated nearly seven years ago is still in operation and producing as good results as when started. Two other filters (Nos. 494 and 496) constructed in 1918, five and one-half years ago, are also producing as perfect results as when first put into operation. Of these three filters, No. 488 contains ferric hydroxide in an amount equal to 34.5 tons per acre, Filter No. 494 aluminum hydroxide in an amount equal to 20.2 tons per acre and Filter No. 496 ferric hydroxide in amounts equal to 14.4 tons per acre.

Removal of Aluminum Hydroxide by the Caustic Solutions applied.

During the year special attention was paid to the action of the caustic soda solutions, used in regeneration or removal of stored organic matter, on aluminum

hydroxide in the filter for it has been found that under certain conditions not as yet well understood but probably due to the use of strong solutions of caustic, appreciable amounts of aluminum hydroxide may at times be dissolved by the caustic soda, this gradually destroying the efficiency of the filter. This probably can be avoided by always using weak solutions of caustic soda in regenerating the filters.

In this study analyses of the sand from Filters Nos. 494, 514 and 515 have shown practically the same amounts of aluminum hydroxide as originally precipitated within these filters. It is difficult, however, to determine this accurately because of the solubility in the caustic solution of the aluminum silicates in the sand itself. Experiments upon the amount of these aluminum compounds which may be dissolved from clean sand by the caustic treatment have been made and show that very large amounts (in one instance reaching 10,000 pounds per acre of filter surface) could be removed by successive applications of from ten to forty-five tons of caustic per acre of filter surface.

A following table shows the results of aluminum hydroxide removal from seven of the Lawrence filters.

Al₂O₃ calculated to Pounds per Acre found in Washings from Filters treated with NaOH.

Filter No.	Size of Sand (Millimeter).	Date of Treatment, 1923.	Tons NaOH Used.	Aluminum Hydroxide Precipitated with	Pounds Al ₂ O ₃ .
488 . .	.25	Feb. 27 Apr. 9 May 8	10 10 10	— — —	148 ¹ 127 ¹ 242 ¹
494 . .	.25	Feb. 27 Apr. 9 May 8 June 25	10 10 10 10	Na ₂ CO ₃	77 188 142 0
512 . .	.25	Feb. 27 Apr. 5 May 8 June 27	5 5 5 5	Na ₂ CO ₃	77 233 192 98
514 . .	.25	Feb. 27 May 8	5 5	Na ₂ CO ₃	127 133
515 . .	.25	Feb. 27 May 8 June 28	10 10 45	Na ₂ CO ₃	156 1,232 15,900 ²
523 . .	.12	Jan. 20 Mar. 2	5 5	CaO	794 786
527 . .	.25	Apr. 9 May 8	5 5	MgO	273 83

¹ Loaded with ferric hydroxide.

² Experiment using 45 tons NaOH per acre. Probably about one-third of this alumina from that naturally on sand grains.

The Use of Ferric Hydroxide in Place of Aluminum Hydroxide.

Owing to the possible removal from the filters of aluminum hydroxide by overdosing with caustic soda, the use of ferric hydroxide has been dwelt upon during the past year. Two of our filters, started in 1917 and 1918 (Nos. 488 and 496) were loaded with this chemical. The reason that the use of ferric hydroxide has not been more dwelt upon at the Station is that ferric sulphate must be used if ferric hydroxide is to be precipitated in a filter and sulphate in a powdered form has not been a commercial product low enough in price to warrant its use in this way. Recently, however, we have found that a ferric sulphate solution can be obtained from certain chemical companies, this solution being known in the chemical and dye trade as nitrate of iron. This is a misnomer, however, used only for trade purposes and apparently because nitric acid is used as an oxidizing agent in its production. This thick, heavy solution contains about four to four-and-one-half pounds of ferric sulphate per gallon and can be obtained at such a price that the sulphate present costs no more than aluminum sulphate. Moreover, as the ferric sulphate is in solution it is 100 per cent available while in aluminum sulphate only 50 per cent of the hydroxide is available.

There are now three new filters in operation at the Station, namely, Nos. 523,

525 and 534 in addition to Filters Nos. 488 and 496, in which ferric hydroxide has been precipitated from this ferric sulphate solution. These filters are efficient color removers and the ferric hydroxide in them is an absolutely stable body, not dissolved by any strength of caustic soda solution used in regeneration.

For special studies nine new filters were put into operation during 1923. Various phases of the operation of all these filters are shown in the following tables. Table No. 1 presents a list of the filters with their date of construction, the pounds of aluminum or ferric sulphate used and the tons of resultant aluminum or ferric hydroxide precipitated within the filter, the depth of each filter, the effective size of the sand of which it was constructed, the number of times it was treated with caustic or regenerated since it was first started, the average number of days between treatments and the percentage of stored color removed by these treatments as nearly as we can determine it. Table No. 2 shows the average color and average pH of the applied water and effluents from these filters during 1923. Table No. 3 presents grains of caustic used in regeneration per gallon of water filtered during the entire period of operation of eight of our older filters, together with the theoretical amount of aluminum or ferric sulphate used during this period, this amount of course simply being obtained by dividing the weight of hydroxide precipitated in each filter by the number of gallons filtered. It does not mean that this hydroxide has been actually used up as in most of these filters the primary amount is still present and the longer they continue in operation the smaller becomes the theoretical weight of hydroxide used per gallon of water filtered.

TABLE No. 1.

Filter No.	Date Filter was Started.	Tons of Aluminum or Ferric Sulphate per Acre.	Tons of Aluminum or Ferric Hydroxide per Acre.	Depth of Filter Sand (Feet).	Effective Size of Sand (Millimeter).	Times Regenerated since Filter was Started.	Average Number of Days between Treatments.	Per Cent of Stored Color Removed by Treatment, 1923.
488	May 14, 1917	64.5 ¹	34.5	4	.25	39	51	72
494	June 7, 1918	80.5	20.2	4	.25	35	46	55
496	Sept. 19, 1918	27.0 ¹	14.4	4	.25	10	128	43
512	Feb. 2, 1921	75.0	18.8	4.5	.23	16	53	51
514	Feb. 2, 1921	150.0	37.6	4.5	.23	10	88	43
515	Feb. 2, 1921	150.0	37.6	4.5	.23	10	85	59
518	April 1, 1921	—	—	4.5	.23	—	—	—
523	May 22, 1922	170.0 ²	42.7	4.5 ²	.12	4	112	62
525	June 8, 1922	150.0 ³	37.6	4.5 ³	.12	3	122	75
527	Feb. 16, 1923	125.0	31.4	2	.25	2	82	14
528	May 2, 1923	150.0	37.6	4	.23	1	142	41
529	May 2, 1923	112.5	28.2	3	.23	1	142	28
530	May 2, 1923	75.0	18.8	2	.23	2	85	43
531	May 2, 1923	—	—	4.5	.23	—	—	—
532	May 18, 1923	150.0	37.6	2	.23	1	128	17
533	May 18, 1923	150.0	37.6	3	.23	1	128	19
534	Sept. 6, 1923	73.5 ¹	39.3	4.5	.23	—	—	—

¹ Ferric sulphate.

² Feb. 23, 1923, reduced to 2.25 feet, and aluminum sulphate to 85 tons.

³ Mar. 19, 1923, reduced to 3.5 feet, and aluminum sulphate to 117 tons.

TABLE No. 2.

Filter No.	Date Filter was Started.	Tons of Aluminum or Ferric Hydroxide per Acre.	Depth of Filter Sand (Feet).	Average Color of Applied Water and Effluents.	Average Alkalinity.	Average CO ₂ .	Average pH.
Applied Water	—	—	—	.41	1.1	0.4	6.2
488	May 14, 1917	34.5 ¹	4	.15	1.5	0.2	6.4
494	Jan. 7, 1918	20.2	4	.17	1.2	0.2	6.6
496	Sept. 19, 1918	14.4 ¹	4	.10	1.4	—	6.6
512	Feb. 2, 1921	18.8	4.5	.16	1.3	0.2	6.6
514	Feb. 2, 1921	37.6	4.5	.15	1.3	0.2	6.5
515	Feb. 2, 1921	37.6	4.5	.12	1.3	0.2	6.8
523	May 22, 1922	42.7 ¹	4.5	.08	1.2	0.3	6.5
525	June 8, 1922	37.6 ¹	4.5	.07	1.3	0.4	6.4
527	Feb. 16, 1923	31.4	2	.07	1.4	0.2	6.6
528	May 2, 1923	37.6	4	.03	1.1	0.4	6.3
529	May 2, 1923	28.2	3	.03	0.9	0.4	6.1
530	May 2, 1923	18.8	2	.10	1.9	0.3	6.5
532	May 18, 1923	37.6	2	.04	1.4	0.5	6.4
533	May 18, 1923	37.6	3	.04	1.3	0.5	6.2
534	Sept. 6, 1923	39.3 ¹	4.5	.03	0.9	—	6.0

¹ Ferric hydroxide.

TABLE No. 3.

Grains of Caustic Soda and Aluminum or Ferric Sulphate used per Gallon of Water filtered during Entire Period of Operation.

Filter No.	NaOH	Aluminum or Ferric Sulphate
488	.50	.07 ¹
494	.51	.14
496	.17	.05 ¹
512	.27	.24
514	.16	.50
515	.46	.51
523	.16	.56
525	.25	.94

¹ Ferric sulphate.

LAWRENCE CITY FILTERS.

The water supply of the city of Lawrence has been taken from the Merrimack River since 1875; since 1893 it has been purified by slow sand filtration and for the past six years the effluents from the filters have been treated with chlorine as the river is very badly polluted by the sewage of cities and towns above Lawrence. Two filters are in use. The older one, 2.2 acres in area, is divided into three sections, — two open and the other covered. The newer filter, 0.75 of an acre in area, is covered. The average volume of water filtered during 1923 was 4,719,000 gallons daily. Liquid chlorine is applied at the pump-well, the average amount during the year being 0.45 parts per million.

Average Chemical Analyses.

Merrimack River. — Intake of the Lawrence City Filters.

[Parts in 100,000.]

Temperature (Degrees F.).	APPEARANCE.		AMMONIA.			Chlorine.	NITROGEN AS —		Oxygen Consumed.	Iron.	Soap Hardness.
	Turbidity.	Color.	Free.	ALBUMINOID.			Nitrates.	Nitrites.			
				Total.	In Solu- tion.						
53	0.2	.37	.0216	.0208	.0136	.54	.020	.0012	.66	.0720	1.1
<i>Effluent from the Lawrence City Filter (Old Filter).</i>											
54	0.0	.39	.0164	.0089	—	.64	.036	.0001	.46	.1170	1.3
<i>Effluent from the Lawrence City Filter (New Filter).</i>											
54	0.0	.30	.0068	.0081	—	.56	.029	.0009	.43	.0380	1.2
<i>Water from the Outlet of the Distributing-Reservoir.</i>											
54	0.0	.40	.0090	.0095	—	.66	.035	.0003	.42	.1120	1.3
<i>Water from a Tap at Lawrence City Hall.</i>											
55	0.0	.39	.0055	.0084	—	.67	.039	.0001	.42	.1150	1.2
<i>Water from a Tap at the Lawrence Experiment Station.</i>											
55	0.0	.39	.0034	.0078	—	.65	.039	.0002	.40	.0980	1.3

*Average Bacterial Analyses.
Merrimack River. — Intake of the Lawrence City Filters.*

BACTERIA PER CUBIC CENTIMETER.			PER CENT OF BACTERIA REMOVED.			PER CENT OF SAMPLES CONTAINING B. COLI.					B. Coli in 100 c.c.
Four Days, 20° C.	TWENTY-FOUR HOURS, 37° C.		Four Days, 20° C.	TWENTY-FOUR HOURS, 37° C.		.001 c.c.	.01 c.c.	0.1 c.c.	1 c.c.	10 c.c.	
	Total.	Red.		Total.	Red.						
8,000	370	126	—	—	—	0	68	100	—	—	7,200
<i>Effluent from the Lawrence City Filter (Old Filter).</i>											
27	4	0	99.7	98.9	100.0	—	—	0	11	54	16
<i>Effluent from the Lawrence City Filter (New Filter).</i>											
18	2	0	99.8	99.3	100.0	—	—	0	10	60	17
<i>Mixed Effluents as Pumped to the Distributing Reservoir.</i>											
46	5	0	99.5	98.6	100.0	—	—	0	9	54	13
<i>Water from the Outlet of the Distributing Reservoir.</i>											
63	7	1	99.2	98.1	99.2	—	—	0	12	61	16
<i>Water from a Tap at Lawrence City Hall.</i>											
67	6	1	99.2	98.4	99.2	—	—	0	6	55	10
<i>Water from a Tap at the Lawrence Experiment Station.</i>											
53	5	1	99.3	98.6	99.2	—	—	0	5	30	8

CHARACTER OF THE SEWAGE USED FOR INVESTIGATIONS UPON SEWAGE PURIFICATION AT THE LAWRENCE EXPERIMENT STATION.

Formerly, each report contained average analyses of the sewage used at the Station in order that engineers and others interested in this work could be informed in regard to the strength of this sewage compared with that of other towns, municipalities, etc., requiring sewage purification areas. It is still necessary occasionally at least, to present these average analyses for the year. The sewage used is pumped to the Station through a pipe about 1,850 feet long from a Lawrence sewer and is taken at a point above the entrance of any mill wastes.

The following tables give the average analyses for the year. Regular sewage is the average of the sewage as pumped; settled sewage presents the average analysis after the sewage coming to the Station has received a certain amount of sedimentation in settling tanks and represents the sewage applied to all filters, tanks, etc., at the Station with the exception of Filters Nos. 1, 4 and 9A.

Average Analyses.

Regular Sewage.

[Parts in 100,000.]

AMMONIA.			KJELDAHL NITROGEN.		Chlorine.	Oxygen Consumed.	Bacteria per Cubic Centimeter.
Free.	ALBUMINOID.		Total.	In Solution.			
	Total.	In Solution.					
3.03	.83	.47	1.41	.83	8.4	5.80	6,350,000
Settled Sewage.							
3.38	.66	.35	1.14	.61	6.8	5.11	3,800,000
Sewage applied to Filters Nos. 1, 4 and 9A.							
2.62	.63	—	1.07	—	7.5	4.66	6,350,000

Average Solids.

Regular Sewage.

[Parts in 100,000.]

UNFILTERED.			FILTERED.			IN SUSPENSION.		
Total.	Loss on Ignition.	Fixed.	Total.	Loss on Ignition.	Fixed.	Total.	Loss on Ignition.	Fixed.
70.1	36.7	33.4	51.3	22.6	28.7	18.8	14.1	3.7
<i>Settled Sewage.</i>								
51.1	24.6	26.5	38.5	15.4	23.1	12.6	9.2	3.4

HOUSEHOLD SEPTIC TANKS.

The two household septic tanks put in operation in June, 1920, were continued throughout 1923. It is only by years of operation of such tanks that the treatment of sewage accomplished by them is clearly learned. These tanks are of concrete construction. One of them is 4 feet long, 2 feet wide and 40 inches deep, with a sloping bottom and a capacity of 185 gallons. The second tank is constructed like the first but consists of two compartments and has a capacity of 370 gallons. The sewage enters each tank through trapped inlets and discharges through a pipe reaching fifteen inches below the surface of the sewage in the tank. A baffle is placed one-third of the distance from the inlet to the outlet and reaches to within eight inches of the surface of the sewage and within ten inches of the bottom of the tank. A trapped outlet is provided for the escape of gas, and air is carefully excluded.

The first tank receives fresh household sewage and the second, Lawrence city sewage as pumped to the Station; both are so operated that theoretically the sewage is held within each for two days. The results obtained during the year show that 56 per cent of the organic matter in the entering sewage did not appear in the effluent of the first tank and that 70 per cent of the suspended solids of the entering sewage was removed. The results of the second tank — the one receiving Lawrence sewage — were 65 and 80 per cent, respectively. The effluents were comparatively clear throughout the year; neither tank was opened during the year to measure the accumulated sludge, the last measurement having been made in 1922.

Average Analyses. — Fresh Sewage applied to Septic Tank No. 507.

[Parts in 100,000.]

AMMONIA.			KJELDAHL NITROGEN.		Chlorine.	Oxygen Consumed.	Bacteria per Cubic Centimeter.
Free.	ALBUMINOID.		Total.	In Solution.			
	Total.	In Solution.					
4.28	.87	.48	1.49	.86	7.8	5.14	7,250,000
<i>Effluent from Septic Tank No. 507.</i>							
3.65	.38	.26	.66	.45	6.8	2.57	2,640,000
<i>Lawrence Sewage applied to Septic Tank No. 508.</i>							
3.13	.71	.42	1.21	.72	9.1	5.36	3,240,000
<i>Effluent from Septic Tank No. 508.</i>							
2.68	.24	.17	.44	.30	6.2	1.84	1,430,000

Average Solids. — Fresh Sewage applied to Septic Tank No. 507.

[Parts in 100,000.]

UNFILTERED.			FILTERED.			IN SUSPENSION.		
Total.	Loss on Ignition.	Fixed.	Total.	Loss on Ignition.	Fixed.	Total.	Loss on Ignition.	Fixed.
67.1	34.6	32.5	46.4	18.3	28.1	20.7	16.3	4.4
<i>Effluent from Septic Tank No. 507.</i>								
43.2	18.2	25.0	36.9	13.7	23.2	6.3	4.5	1.8
<i>Lawrence Sewage applied to Septic Tank No. 408.</i>								
68.3	34.9	33.4	49.1	21.4	27.7	19.2	13.5	5.7
<i>Effluent from Septic Tank No. 508.</i>								
38.8	15.2	23.6	35.0	14.0	21.0	3.8	1.2	2.6

ACTIVATED SLUDGE. — PURIFICATION OF SEWAGE BY AERATION.

During the past eleven years the method of purification of sewage by aeration and circulation of sludge or growths has not only been experimented with in many places in this country and abroad but activated sludge plants of a considerable size have been built by various municipalities and larger ones are now being constructed. This method of purification was developed at the Lawrence Experiment Station during 1911 and 1912 when it was found there that sewage treated in this manner in gallon bottles and carboys became quite well purified. The period of

aeration given to the sewage was reduced from time to time from twenty-four hours to six hours until finally a six-hour period was given. A considerable portion of our work during these early years was described in our reports for the years 1911, 1912 and 1913. In 1913 we began to make further investigations upon the purification of sewage by aeration in tanks containing a few layers of slate, believing that the method first developed by us could be improved upon in this manner. We found eventually, however, that tanks free from these slate layers gave the better results and were more practical.

There is in operation at the Station at the present time an activated sludge tank, No. 485, which was started in April, 1917. This tank, a description of which has been given in previous reports, is operated at a rate of about 7,000,000 gallons per acre daily. Air is applied through perforated brass pipes placed in the bottom of the tank and the volume used has averaged since the tank was started about 2.8 cubic feet per gallon of sewage treated.

During 1913 the effluent from this tank was stable whenever tested, clear, containing only 2.5 parts in 100,000 of matters in suspension and there was some nitrification, the nitrates in the effluent averaging .06 parts in 100,000. In the operation of this tank a volume of sludge amounting to about 20 per cent of the capacity of the tank is used. During the year the surplus sludge has been equivalent to 1,117 pounds of dry matter per million gallons of sewage treated. This sludge contains 5.18 per cent nitrogen and 11.2 per cent fats.

A slate aeration tank, No. 509, has been in operation at the Station since July, 1920. In this tank is one stack of slates separated by two-inch concrete blocks, these slates occupying only 3.4 per cent of the total capacity of the tank. The tank is aerated in the same way and with the same volume of air per gallon of sewage treated as Tank No. 485 and is operated on the fill and draw plan. This tank has given nearly, but not quite, as good results as Tank No. 485. Its effluent has been comparatively clear, containing only 23 per cent as much matter in suspension as the applied sewage. The nitrates in the effluent have been slightly greater than in the effluent from the true activated sludge tank but the effluent from the tank has contained more organic matter and been less stable than the effluent from Tank No. 485.

Average Analyses. — Sewage applied to Activated Sludge Tank No. 485.

[Parts in 100,000.]

APPEARANCE.		AMMONIA.			KJELDAHL NITROGEN.		Chlorine.	NITROGEN AS —		Oxygen Consumed.	Bacteria per Cubic Centimeter.
Turbidity.	Color.	Free.	Total.	In Solution.	Total.	In Solution.		Nitrates.	Nitrites.		
—	—	3.36	.66	.33	1.18	.58	7.3	—	—	4.37	3,800,000
<i>Effluent from Activated Sludge Tank No. 485.</i>											
0.9	.67	2.09	.16	.11	.29	.21	7.0	.06	.0243	1.19	644,000
<i>Sewage applied to Slate Aerating Tank No. 509.</i>											
—	—	3.61	.77	.43	1.28	.75	8.6	—	—	3.81	6,350,000
<i>Effluent from Slate Aerating Tank No. 509.</i>											
2.4	.87	2.96	.41	.28	.69	.50	7.3	.07	.0136	2.43	1,692,000

Average Solids. — Sewage applied to Activated Sludge Tank No. 485.

[Parts in 100,000.]

UNFILTERED.			FILTERED.			IN SUSPENSION.		
Total.	Loss on Ignition.	Fixed.	Total.	Loss on Ignition.	Fixed.	Total.	Loss on Ignition.	Fixed.
66.2	36.5	29.7	47.8	21.5	26.3	18.4	15.0	3.4
<i>Effluent from Activated Sludge Tank No. 485.</i>								
36.1	11.0	25.1	33.6	9.3	24.3	2.5	1.7	0.8
<i>Sewage applied to Slate Aerating Tank No. 509.</i>								
65.6	33.9	31.7	45.1	20.2	24.9	20.5	13.7	6.8
<i>Effluent from Slate Aerating Tank No. 509.</i>								
42.5	18.4	24.1	37.7	15.3	22.4	4.8	3.1	1.7

TRICKLING FILTERS.

Practically all the larger, modern plants constructed since 1900, for the purification of sewage of cities, have been of the trickling filter type although activated sludge plants of large capacity are now being constructed in this country and abroad. Trickling filter construction has become fairly well standardized but questions in regard to this method have been asked of this Department with increasing frequency during late years. These questions have to do with the most effective and economical depth of such filters, the grade of material to be used and the methods of operation to be followed. There is also keen interest in regard to the permanency of such filters, that is, the length of the period of operation before cleaning or changing the filtering material.

During 1923 ten such filters were operated at the Station. The oldest of these, Filter No. 135, is in its twenty-fourth year of operation. This filter contains 10 feet in depth of filtering material, was operated during the year at a rate of 1,500,000 gallons per acre daily and every sample of the effluent collected was stable on incubation.

Two sets of filters, Nos. 452 to 455, inclusive, and Nos. 472 to 475, inclusive, are kept in operation to show the rate efficiency, etc., of different depths and filtering materials of different grades. Filters Nos. 452 to 455, 4, 6, 8 and 10 feet in depth; respectively, are constructed of broken stone, all of which will pass a one and one-half inch screen and be retained by a one-half inch screen. Filters Nos. 472 to 475, inclusive, are 4, 6, 8 and 10 feet in depth, respectively, constructed of a much coarser grade of broken stone, all of which will pass a three-inch screen and be retained on a one and one-half inch screen. The rates of operation of each filter and the purification results obtained are shown in a following table.

Of these eight filters, No. 453 was operated at a very high rate considering its depth for investigations in regard to refiltration. The table shows, however, that the other seven filters confirm results given in previous reports; that is, the greater rate efficiency and economy of the deeper filters and the greater purification obtained by those of the finer grade of broken stone.

Refiltration of a Trickling Filter Effluent.

Filter No. 522, started in February, 1922, contains nine feet in depth of 1-inch to 2-inch crushed stone. During 1923 it received the effluent from Filter No. 453 after 51 per cent of the solids in suspension were removed by sedimentation. During the sedimentation period nitrates equivalent to .79 parts in 100,000 were reduced and the available oxygen set free in this way was equivalent to 2.26 parts in 100,000 dissolved oxygen. This undoubtedly had a stabilizing and clarifying action on the effluent from Filter No. 453 before it was applied to Filter No. 522. The effluent from this secondary filter was always stable.

Average Analyses. — Effluents from Trickling Filters Nos. 135, 452, 453, 454, 455, 472, 473, 474, 475, 522 and Applied No. 522.

[Parts in 100,000.]

Filter No.	Quantity Applied. Gallons per Acre Daily.	AMMONIA.			Kjeldahl Nitrogen.	Chlorine.	NITROGEN AS —		Oxygen Consumed.	Bacteria per Cubic Centimeter.
		Free.	ALBUMINOID Total.	In Solu- tion.			Ni- trates.	Ni- trites.		
135	1,435,000	1.78	.35	.19	.62	6.8	2.02	.0430	2.44	708,000
452	768,000	2.00	.49	.29	.86	6.4	1.57	.0536	3.10	900,000
453	2,209,000	2.20	.41	.24	.75	6.6	1.25	.0548	2.56	1,280,000
454	1,728,000	2.55	.43	.24	.77	6.5	.89	.0614	2.47	2,280,000
455	2,389,000	1.78	.33	.17	.63	6.2	1.51	.0555	2.25	1,230,000
472	768,000	2.55	.45	.28	.85	6.4	.87	.0500	2.80	2,500,000
473	1,091,000	2.56	.41	.24	.76	6.4	.64	.0474	2.73	2,380,000
474	1,728,000	2.31	.43	.26	.76	6.5	.62	.0498	2.50	2,560,000
475	2,389,000	1.66	.43	.22	.79	6.2	.79	.0816	2.51	2,200,000
522	6,060,000	1.36	.19	.13	.34	6.2	.85	.0793	1.54	2,370,000
A 522 ¹	—	1.64	.26	.18	.49	6.2	.46	.0836	2.10	3,190,000

¹ Applied to Filter No. 522.

OPERATION OF CONTACT FILTERS.

Contact Filter No. 175 is kept in operation as a study of the permanency of this type of filter and as an example of this method of sewage purification. It was started in 1901 and contains 39 inches in depth of coke passing a one-inch screen and retained by a one-quarter-inch screen.

During 1923 the filter was flooded once daily with settled sewage; a period of two hours before draining was given and every sixth week the filter remained out of operation. Its effluent was clear, well-nitrified and always stable. Because of clogging inherent in contact filters, the material of this filter has been removed and washed twice, — once in 1911 and again in 1920. The open space decreased during the year from 83 to 77 per cent.

Average Analyses. — Effluent from Contact Filter No. 175.
[Parts in 100,000.]

Quantity Applied.	AMMONIA.			Kjeldahl Nitrogen.	Chlorine.	NITROGEN AS —		Oxygen Consumed.	Bacteria per Cubic Centimeter.
	Free.	ALBUMINOID.				Nitrates.	Nitrites.		
		Total.	In Solu- tion.						
Gallons per Acre Daily.									
322,000	.80	.18	.12	.34	6.6	1.82	.0817	1.27	1,420,000

Average Solids. — Effluent from Contact Filter No. 175.
[Parts in 100,000.]

UNFILTERED.			FILTERED.			IN SUSPENSION.		
Total.	Loss on Ignition.	Fixed.	Total.	Loss on Ignition.	Fixed.	Total.	Loss on Ignition.	Fixed.
39.0	14.8	24.2	37.5	14.4	23.1	1.5	0.4	1.1

INTERMITTENT SAND FILTERS OPERATED WITH UNTREATED SEWAGE.

Filters Nos. 1, 4 and 9A.

Each of these three sand filters is 1/200 of an acre in area and at the end of the year Filters Nos. 1 and 4 had been operated continuously for nearly thirty-six years and Filter No. 9A, thirty-three years. Regular sewage without preliminary clarification has always been applied to these filters and for many years it has been the practice to apply only as much as can be purified without materially increasing the amount of organic matter stored within the filters. For many years the surface of Filters Nos. 1 and 9A has been trenched and ridged late in the fall and leveled in the spring. Board coverings are put over the trenches on all three filters, during the winter, which aids materially in keeping the surface of the trenches from freezing. During the year the filters were dug over to a depth of from ten to twelve inches twice and raked twelve times.

Average Analyses. — Effluent from Filter No. 1.
[Parts in 100,000.]

TEMPERATURE (DEGREES F.).		AMMONIA.		Chlorine.	NITROGEN AS —		Oxygen Consumed.	Alkalinity.	Bacteria per Cubic Centimeter.
Applied.	Effluent.	Free.	Albuminoid.		Nitrates.	Nitrites.			
52	59	.0889	.0409	6.1	2.02	.0007	.47	—1.7	21,100
<i>Effluent from Filter No. 4.</i>									
52	59	.0043	.0116	5.5	1.46	.0001	.26	—0.8	820
<i>Effluent from Filter No. 9A.</i>									
52	59	.0243	.0278	5.9	1.88	.0007	.55	0.05	10,200

Report of the Division of Food and Drugs

Hermann C. Lythgoe, *Director*

The Food and Drug Division of the Massachusetts Department of Public Health has been engaged during the year 1923 in the usual routine work of the enforcement of the milk, food, drug, cold storage, slaughtering, bakery, soft drink, mattress and coal laws; in the examination of samples submitted by police authorities; and also in the manufacture of arsphenamine.

During the latter part of the fiscal year the Purchase Laboratory of the Department of Administration and Finance was added to the Food and Drug Division of this Department.

The number of samples examined was somewhat less than those examined last year but more than those examined in 1922. The samples exclusive of those examined by the purchase laboratory consisted of

6,367 samples of milk

1,797 samples of food other than milk

377 samples of drugs

6,367 samples of liquor submitted by Police Departments

150 samples of narcotics, etc., delivered by Police Departments

236 samples of coal sold to citizens of this State

making in all a total of 15,293 samples. In addition, a number of samples of coal and a few miscellaneous articles were examined for the Commission on Administration and Finance.

There were 278 prosecutions, — one more than were prosecuted last year. Of these cases 256 resulted in conviction, 19 were found not guilty, 1 case was quashed, 1 was placed on file without plea, and 1 case was dismissed for want of prosecution.

The following table gives a summary of the court cases:

	Con- victed.	Quashed.	Filed without Plea.	Dis- missed.	Dis- charged.	Total.
<i>Milk:</i>						
Low standard	19	—	—	—	—	19
Cream removed	9	—	—	—	2	11
Watered	37	—	—	—	2	39
<i>Cream:</i>						
Low standard	—	—	—	—	1	1
<i>Ice Cream:</i>						
Low standard	—	—	—	—	2	2
<i>Butter:</i>						
Low standard	—	—	—	—	1	1
<i>Adulterated and Misbranded Foods:</i>						
Cider (preservatives)	4	—	—	—	—	4
Sausages (preservatives)	10	—	—	—	—	10
Sausages (cereal in excess of 2 per cent.	39	—	—	1	2	42
Sausages (colored)	10	—	—	—	—	10
Maple syrup	1	—	—	—	—	1
Olive oil	4	—	—	—	—	4
Vinegar	1	—	—	—	—	1
<i>Decomposed Foods:</i>						
Pork	1	—	—	—	—	1
Eggs	—	—	—	—	1	1
Eggs (misbranded)	5	—	—	—	3	8
Eggs (false advertising of)	8	—	—	—	1	9
Eggs (cold storage not so labeled)	53	—	—	—	1	54
Violation of C. S. laws other than eggs	2	—	—	—	—	2
Violation of slaughtering laws	19	1	1	—	3	24
Violation of mattress laws	17	—	—	—	—	17
Totals	256	1	1	1	19	278

The following table gives a summary of the confiscations during the past year:

Article.	Number of Confiscations.	Weight — Pounds.
Butter	1	366
Poultry	5	1,806½
Game	2	80
Meat	21	9,520
Fish	5	22,365
Fruit	2	17 cans
Milk	1	71 bbls.
37		34,137½ lbs., 17 cans, 71 bbls.

Milk.

The inspectors collected 6,174 samples of milk, of which 1,782 were below the legal standard, 272 contained added water, and 174 had a portion of the cream removed. The average composition of the milk collected by the inspectors and not found to be adulterated was somewhat below that reported last year. It is probable that a certain amount of adulterated milk will escape detection and will be recorded in this average. The figures are as follows: Total Solids, 12.50 per cent; Fat, 3.78 per cent; Solids not Fat, 8.72 per cent.

The samples collected were characterized by an unusual amount of adulteration during the colder weather. During the month of August nearly half the samples were found to be below the legal standard. A careful analysis of the figures, however, showed that the bulk of this low standard milk was between 11.8 per cent and 12.00 per cent of solids. A summary of the milk statistics will be found in Tables 2 and 3.

Foods Other than Milk.

A summary of the analyses of foods other than milk will be found in Table 4. Only such foods as need special comment will be discussed here.

The total samples examined (1,797) were less than were examined last year. Of these samples 492 were found to be adulterated. A few samples of condensed milk were found not bearing a statement of the amount of dilution necessary to produce milk above the legal standard.

Of 15 samples of cream examined 3 were found to be low in fat. This resulted in one court case, the defendant being found not guilty. The single sample of spice reported as adulterated was a sample of colored paprika used by a sausage maker for the purpose of coloring his sausages in an indirect manner.

Twelve samples of vinegar were found to be adulterated. Some of these were below the legal standard of 4 per cent acid. Some were made from cannery waste and others were simply diluted acetic acid. The latter was responsible for a prosecution, resulting in conviction.

Eggs.

There were 312 samples examined and 170 were classed as illegal. There were 72 prosecutions relative to eggs, of which 54 were for selling cold storage eggs not properly labeled, 8 were for selling eggs which were misbranded, 9 were for false advertising of eggs, and 1 was for the sale of rotten eggs. Practically all the eggs were edible. In a few instances one rotten egg was found in each box holding a dozen eggs, but insufficient evidence was obtained to show that this was other than an accident.

Eggs are produced in the spring faster than they are consumed and are consumed in the fall faster than they are produced. This is accompanied by a fall in price in the spring months and a rise in price in the fall. Cold storage is the method employed to take care of the surplus in the spring and to relieve the shortage in the fall and winter.

The reasons for the violations of the laws in regard to the sale of eggs are as follows:

First: There is a tendency on the part of the dealer, when grading eggs, to put as many eggs in the higher grade as he thinks the traffic will stand.

Second: There is a general holding back of the supply by producers, brokers, wholesalers, and retailers in the fall when prices are rising, resulting in a general deterioration of the market supply.

Third: There is a popular prejudice against the consumption of cold storage eggs, which does not exist however when these eggs are sold as fresh eggs at fresh-egg prices.

Fourth: The commercial grading terms are without meaning and the trade will not furnish sufficiently accurate definitions of these terms to cause the conviction of persons selling eggs apparently not conforming to these definitions. The term "hennery," for example, has been applied for some time in New England and New York to the best grade of eggs. This grade is always quoted in the newspapers at the highest prices. There appear to be two meanings for this term: one, which is the term which the seller wishes the buyer to understand, namely that such eggs are the best eggs on the market; the other is the meaning which

he himself understands, namely, any hen's egg fit for food. This variance in meaning is very convenient for the seller but unsatisfactory for the buyer.

One case involving this term was prosecuted, resulting in a finding of not guilty. An expert from the trade was obtained, who stated to agents of this Department that an egg ceased to be a hennery egg after it was a week old. Upon the witness stand, however, he said that the word "hennery" as applied to eggs, without qualification, doesn't signify a whole lot. The expert for the defense, a Boston wholesale produce dealer, said that an egg is understood to be a hennery egg as long as it is fit for food. Anything is supposed to be a hennery egg which is produced from a hen and sold as an egg.

Some time after the trial, the expert engaged by the Commonwealth stated that he had been misinformed as to our intention at the time of his first interview with the agents of this Department. He understood that we wished to purchase some eggs.

A variety of storage eggs somewhat different from the ordinary storage egg has appeared on the market. This egg is treated with hot paraffin in the spring, which seals the shell and sterilizes the interior membrane. These eggs are then placed in cold storage and are sold as storage eggs. The paraffin treatment will prevent evaporation of the egg and it will also prevent the absorption of odors. These eggs, so far as the taste is concerned, are apparently as good as fresh laid eggs. They of course undergo the usual slight deterioration which all cold storage eggs undergo.

The results of the chemical analyses of eggs on the market during the months of October and November show that the cold storage eggs are decomposed to a less extent than the so-called fresh eggs sold at that time.

SAUSAGES.

There were 947 samples examined, of which 144 were adulterated. The sausages adulterated contained cereal in excess of 2 per cent; were colored; and a few of them contained a sulphite preservative. The use of sulphites as a preservative in sausages has been practically extinct in this State for a number of years. There are a few manufacturers in Holyoke and Chicopee, however, who still continue to use this product.

A number of prosecutions were instituted for failure to label the sausages as required by the regulations.

The use of starch in frankforts, bologna, and similar cooked sausages is merely for the purpose of absorbing water. One pound of starch will absorb about four pounds of water when cooked. The statutes permit the addition of 2 pounds of cereal per 100 pounds of finished sausages, and therefore 8 pounds of water can legally be sold as sausage. If, however, the manufacturer uses 3 or 4 pounds of cereal he can add 12 or 16 pounds of water to every 100 pounds of finished product, thereby exacting considerable excess profits by way of the water faucet. Cereal is added to pork sausage for the purpose of holding back the fat while cooking, and, therefore, if a high fat pork mixture is used in this type of sausage and considerable cereal is added, there will be something left in the skins after the sausage is cooked. The grades of pork sausage upon the market made without cereals are made from lean pork and are therefore more expensive than those made from fat pork.

The coloring of sausages is prohibited by statute, and it appears to be a relatively harmless amusement until the reason is carefully considered. The frankfort sausage is usually bought on its color, the dark colored sausage being preferred. This color is produced by a prolonged smoking, which, however, takes considerable time and results in loss of moisture and consequent loss of weight. If the sausage is colored the smoking can be considerably shortened and more water can be sold to the public at the price of sausages.

An inspector of this Department found one storekeeper exposing his sausages in a show case illuminated with a red light. The sausages were not colored, but they sold better than if they were exposed under a white light.

Sausage manufacturers have been repeatedly prosecuted, convicted, and fined, and they continue the process of adulterating sausages, presumably because the profits are greater than the fines. A sausage called "Kiszke," made by the Polish people, was found to be in violation of the law and a number of manufacturers were

prosecuted. Because of these prosecutions a bill was introduced into the Legislature to legalize the manufacture and sale of these sausages. This bill proposed to amend the present sausage law by permitting the sale of "Kiszke" sausages as such, if such sausages contain not less than 40 per cent of vegetable or vegetable products and are offered for sale under their own distinctive names. The sausage makers stated that they were using at least 50 per cent of buckwheat in these sausages.

In preparing evidence for submission to the Legislative Committee upon this proposition an Inspector of this Department visited a sausage factory and saw a batch of these sausages manufactured. There were used 15 pounds of buckwheat, 15 pounds of pigs' plucks and hearts, 15 pounds of rind, 5 pounds of snouts, 5 pounds of ears, 7 pounds of blood, $\frac{1}{2}$ pound of spice, and 6 pounds of casings, the total weight being 68 $\frac{1}{2}$ pounds. The total weight of the finished batch was 112 pounds, making 43 $\frac{1}{2}$ pounds of water. The amount of added water was therefore 38.8 per cent. The price of these sausages was 15c. per pound and the cereal content was 13.4 per cent. The sausage contained on analysis 7.28 per cent of starch and 59 per cent of water.

The buckwheat was first placed in a tub and covered with boiling water. After two hours the meat and spices were added and the mixture was cooked for twenty minutes. It was then cooled, passed through the grinder, the blood added, after which it was mixed, stuffed into the casings, and cooked for twenty minutes. Sixteen samples examined by the Department were found to contain from 2.66 per cent to 23.50 per cent of cereal.

A bill was passed permitting the sale of such sausages provided they contained not less than 20 per cent of vegetables or vegetable products. There have been, however, many violations of this law since it was changed. The average amount of cereal in these sausages is about 13 per cent.

BUTTER.

There were 142 samples of butter examined, of which 44 were below the standard of 80 per cent fat adopted by this Department. This standard was formerly 82 $\frac{1}{2}$ per cent of fat as adopted by the U. S. Department of Agriculture. That Department however, never enforced the standard and permitted the shipment of butter into this State containing considerably less than 82 $\frac{1}{2}$ per cent of fat. An attempt made to cause that department to enforce this standard resulted in a refusal because of the strong demand on the part of the trade for a reduction of the standard to 80 per cent.

The Department of Agriculture neither reaffirmed the old standard nor adopted the new one, but advised the butter industry that pending official decision in the matter action would not be taken against butter because of deficiency in butter fat if the fat content were not less than 80 per cent or if the moisture content were not more than 16 per cent. A bill was introduced into Congress establishing a fat content of not more than 80 per cent. This bill was passed and is now law so far as interstate shipments of butter are concerned. The Secretary of Agriculture adopted a standard of not less than 80 per cent fat and not more than 16 per cent of moisture.

During the latter part of June and the early part of July a number of samples of butter were examined in cooperation with the Department of Agriculture and the market was found to be in a deplorable condition, the butter men probably feeling that they were entitled to as much leeway under the new standard as they were under the former so-called standard. Butter was found with a moisture content as high as 34 per cent and a fat content as low as 64 per cent. The first case prosecuted resulted in a finding of not guilty, for the purely technical reason that no penalty was applied to the sale of articles of food not conforming with the rules, regulations and standards of this Department, whereas the law provided a penalty against the manufacturer of such articles. A recommendation for a change in this law has been submitted to the Legislature.

Many butter dealers at the hearings said that it was difficult to get the moisture content up to 16 per cent and at the same time keep the fat content above 80 per cent, particularly in the case of highly-salted butter. When they were informed that the regulation would not prohibit the sale of butter containing less

than 16 per cent of water they inferred that they should be entitled to put in at least 16 per cent of water even if the fat did run under 80 per cent in the case of highly-salted butter.

An attempt is now being made to prosecute certain dealers for violation of the general food law by selling butter containing added water as an adulterant. It is proposed to use the analyses of 437 samples of commercial butter sold in this State during the past three years as evidence of the composition of normal butter¹.

Practically all the adulterated butter collected this spring was in cold storage and was never sold to the public. The depositors removed the butter and either reworked it, if possible, or removed the butter oil and used this oil in the manufacture of ice cream.

There were 79 samples of olive oil examined, of which 19 were found to contain cotton seed oil. There were four cases prosecuted and a number of cases are still pending at the close of the fiscal year.

DRUGS.

There were 377 samples of drugs examined, of which 80 were found to be adulterated. There is at present very little drug adulteration going on. Most druggists are purchasing their preparations in bulk from reliable manufacturers and there is no incentive to put up poor quality goods when good commercial material can be bought at low prices. The present alcohol regulations have rendered it difficult for the retail druggist to prepare his own tinctures and spirits and this has stimulated purchasing from wholesale houses.

We found, however, that there was considerable adulteration in connection with extract of ginger. This article had been used by many people solely for its alcoholic content and in past years it was a common practice to manufacture tincture of ginger of lower alcoholic content than the U. S. P. variety. These adulterated tinctures varied in alcohol between 2 per cent and 75 per cent with a mean variance between 35 per cent and 50 per cent. They were made either by diluting the U. S. P. tincture with water or by dissolving ginger oleo resin in 95 per cent alcohol and diluting with water. These cloudy diluted tinctures were then clarified by shaking with magnesia and filtering and the filtrate was practically free from ginger resins but possessed a pronounced ginger odor and flavor. This diluted material was put up in very attractive bottles, some of which were labeled "Picnic Flasks" and its sale was formerly common in Massachusetts towns when the citizens voted not to grant liquor licenses.

These diluted tinctures have practically disappeared from the market but the sale of tincture of ginger has greatly increased. The Internal Revenue Department in decision No. 3092 declared tincture of ginger to be an intoxicating beverage but if the tincture were made with 400 grams of ginger instead of 200 grams per liter of finished product, the article would be declared to be a non-intoxicating beverage. Shortly after this decision was promulgated, the double strength ginger appeared on the market and there were great differences of opinion as to the correct total solids of this new tincture. A number of samples of ginger powders were therefore obtained from eight reliable spice grinders and wholesale dealers, and 79 samples of tincture of ginger were made with varying concentration of both alcohol and ginger. The method of analysis finally adopted is as follows:

Place a flat bottom platinum milk dish on a tray upon the top of a steam bath. Measure 10 c.c. of the tincture into the dish. When the contents of the dish appear to be dry, place the dish over the live steam and dry for ten hours. Cool in a desiccator and weigh. Express the results as grams per 100 c.c. It was found that with constant percentage of alcohol the solids increased in direct proportion to the amount of ginger added. The total solids of these double strength gingers varied between 1.39 and 2.23 grams per 100 c.c. After this work was completed samples of double strength ginger were obtained from manufacturers, 38 of these samples being found to be other than double strength ginger. Sixteen cases were prosecuted. All were convicted. One of these cases was appealed, and in the Superior Court the case was dismissed because of a defect in the complaint.

LIQUOR.

There has been an increase in the liquor samples examined, 6,367 samples being submitted by the police authorities of 133 cities and towns; 32 localities each sub-

¹ These prosecutions resulted in conviction and fines.

mitting more than 20 samples, submitted in all 5,651 samples, which was 712 more than the same localities submitted in 1922. The total samples submitted exceeded the 1922 samples by 601 and exceeded the 1921 samples by 2,536. A careful study of the figures shows that the increase in samples was due to increased activity in certain localities. Of these samples submitted, 746 were classified as beer, 106 were cider, 436 were wine, 4,262 were distilled liquors, 41 were flavoring extracts, 594 were alcohol, and 182 were miscellaneous samples. The miscellaneous samples include alcoholic sink drainings, a mixture of kerosene and liquor, mash, coloring matter, alcoholic proprietary medicines, and a number of other alcoholic preparations obtained from so-called drug stores. Twenty-five per cent of the beer samples contained less than 1.6 per cent alcohol; 50 per cent contained from 1.6 to 3.4 per cent alcohol; 25 per cent contained from 3.4 to 6.9 per cent alcohol; and 45 per cent contained more than 2.75 per cent alcohol. Of the cider samples, 25 per cent contained less than 5.1 per cent alcohol; 50 per cent contained from 5.1 to 6.6 per cent alcohol; and 25 per cent contained from 6.6 to 10 per cent alcohol. Of the wine samples, 25 per cent contained less than 7.3 per cent alcohol; 50 per cent contained from 7.3 to 10.2 per cent alcohol; and 25 per cent contained from 10.3 to 18 per cent alcohol. The averages were 2.6 per cent for beer; 5.6 per cent for cider; and 8.9 per cent for wine. The distilled liquors varied from 20 to 53 per cent alcohol. The bulk of them, however, were between 32 and 44 per cent alcohol, with an average of 37.5 per cent alcohol, — considerably less than what commercial distilled liquors contained prior to January 1, 1919. The average alcoholic content of all the samples was 34.44 per cent.

In Table 6 will be found a summary by localities of the liquor samples submitted.

COLD STORAGE.

There were comparatively few violations of the cold storage law, except in the sale of cold storage eggs as fresh eggs or not properly labeled as required by the statutes. Requests for extension of time on goods in storage were granted on one lot of butter, 10 lots of poultry, 5 lots of game, 2 lots of beef, 15 lots of pork, 1 lot of veal, and 38 lots of fish. Twenty-nine of these fish extensions were for mackerel, requests being made by 16 different depositors.

Requests for extension were refused on 1 lot of frozen eggs, 1 lot of butter, 1 lot of beef, and 4 lots of fish.

There were ordered out of storage at the end of twelve months, 2 lots of frozen eggs, 1 lot of butter, 16 lots of poultry, 8 lots of game, 18 lots of beef, 12 lots of pork, 3 lots of mutton, 4 lots of miscellaneous meat, and 12 lots of fish.

The details of our actions on extension requests will be found in Tables 7, 8, and 9.

There were 67 warehouses licensed during the year. These warehouses report monthly the amounts of food placed in storage and the amounts on hand. A summary of these statistics will be found in Tables 10 and 11.

SLAUGHTERING.

There has been carried out the usual routine work of investigating nominees for the positions of local slaughtering inspectors; instructing candidates for such positions; investigating the inspection of slaughtering; and enforcing the law when violations have been discovered.

Many of the local slaughtering inspectors are not paid adequately for the amount of work which they are required to do. Because of this inadequate compensation, certain inspectors have been in the habit of charging the butchers for putting the official stamp upon the carcasses which had passed inspection. In some instances this was carried out with the approval of the local health authorities. This situation was unsatisfactory and an opinion was obtained from the Attorney-General to the effect that such procedure was illegal. A copy of this decision was sent to the local Health Departments, the inspectors, and the licensed butchers. In some instances the members of the local boards of health were apparently desirous that improper inspection be carried out by their inspector. Several instances of violations of the law were traced to a certain inspector and when interviewed by the inspector of this Department his attitude was nearly obstructive. This inspector was not approved after he had placed the official stamp upon a carcass affected with generalized tuberculosis. A member of the Board of Health made

a very spectacular and passionate plea for the retention of this man as inspector.

Another local inspector was called into court as a witness to corroborate certain conversation between the butcher and the inspector of this Department. This local inspector had a painful lapse of memory upon the witness stand and the case was consequently lost.

One local inspector showed on his reports very few confiscations. This was called to the attention of the agents of the local board of health. Whenever the inspectors of this Department were at the slaughterhouse no diseased conditions were found and the work apparently was going on in a satisfactory manner. The inspector was replaced a few years ago by another inspector, who confiscated in the first month more than the previous inspector had confiscated in his last five years. This inspector is still doing excellent work.

Notwithstanding the fact that violations are found and continual policing is necessary in order that the inspection should be carried out properly, it is a fact that Massachusetts inspection is upon a very high plane and compares very favorably with the U. S. inspection. The statutes of this state recognize the U. S. inspection stamp and also the inspection stamp of any city, town, or state inspector in any other state, provided the inspector is appointed or approved by a local or a state health department.

It has been found that many cities and towns in other states, and certain state departments have given or sold an inspection stamp to any person desiring the same regardless of the qualifications of the inspector. A city health department in one of the New England States passed a slaughtering inspection ordinance and was obliged to prohibit the shipment of meat from a slaughterhouse in an adjoining town because of improper inspection. A letter was written to the Secretary of the State Board of Health requesting him to see that the inspection was carried out in a proper manner in that town. The Secretary of the State Board of Health replied to the letter that he had no authority over the inspector and the inspection stamp was merely given to the inspector for the purpose of stamping meat intended for shipment to Massachusetts.

It has been found necessary to prosecute persons shipping meat from New Hampshire, Rhode Island, Connecticut, and New York. A large number of carcasses of hogs shipped from Newport, Rhode Island, to Fall River were found afflicted with hog cholera and the carcasses were confiscated. These bore the stamp of the town of Tiverton, Rhode Island.

Immature veal has been killed in New York State; has been stamped by the local inspector; and has been shipped to Pittsfield, Massachusetts, for sale. One case of violation of the slaughtering laws was tried in Dudley, the animal being killed in Connecticut and brought across the line without proper inspection. Because of this inadequate inspection in other states, it has been recommended to the Legislature that the law be changed whereby only Massachusetts and U. S. inspection is recognized in this State.

BAKERIES.

Two hundred eleven bakeries located in 29 cities and towns have been inspected during the year. The bakeries are in far better condition than they were a year ago. The usual procedure has been followed of inspecting the bakeries; notifying the local boards of health of the defects found; and requesting the local boards of health to see that the defects are remedied. This is now working out in a very satisfactory manner. Of the defects found by our inspectors, the greatest number were for improper protection of the products. The least cause for complaint was domestic rooms connected with the bakery. Table 12 gives a summary of the inspections made by this Department.

MATTRESSES.

At the last session of the Legislature the mattress law was practically rewritten with no change, however, in the substance of the law. The rewritten law is technically much better than the old law and prosecutions for violations are more easily made.

During the past two years practically all the work has been directed toward the proper labeling of mattresses. Formerly, the mattresses, if tagged, bore labels

with trade terms for the name of the filler, such as "Comfort," "Soft Top," "Pure S. A.," etc. Most mattresses are now tagged with labels meaning something and it has become necessary to open such mattresses in the factories and in the stores. The fillings did not always correspond with the labels. Microscopic examinations of these fillings showed that mattresses labeled "Kapok" sometimes contained considerable cotton waste and some wool waste, as well as considerable dust and dirt, indicating the use of second-hand material.

There were 3 cases for the use of second-hand material in mattresses. One case was filed. Two were found guilty and penalties imposed. In 1 of these cases in Pittsfield the inspector found a large package of material obtained from a junk dealer in Springfield. A fine of seventy-five dollars (\$75.00) was imposed upon this case.

In a Worcester department store mattresses were found containing considerable second-hand material. The mattresses were labeled "Kapok." A mattress expert was called in, who examined the filling and found it to be second-hand material. The manufacturer called at the office of this Division and stated that he used only pure Kapok, a sample of which he left at the office and which in fact was pure Kapok. He stated that the reason for the large amount of dust in the mattresses was because of the speed of his picker. A microscopic examination of the filling showed it to contain cotton and wool in addition to the Kapok. The manufacturers were prosecuted and fines amounting to four hundred dollars (\$400.00) were imposed. One furniture dealer was prosecuted for selling mattresses improperly labeled. These mattresses were purchased in another state and were labeled "Pure Kapok" but were sold at a price per pound less than the cost of Kapok per pound. This case resulted in a conviction.

COAL.

During the early part of the year, at the time of the coal strike, it was found financially advantageous to certain people to purchase refuse piles in Pennsylvania; ship them to Massachusetts; and sell them as coal at coal prices. This resulted in a number of complaints and this Department was requested to make analyses of this alleged coal.

The first sample was examined at the request of the Police Department of Somerville. It was found difficult to get a complaint because of the inadequacy of the law. The Attorney-General's office was appealed to and three forms of complaint were suggested. The defendant was tried upon these complaints and was held for the Grand Jury. The Grand Jury found indictment upon this and a number of other cases. The defendants were tried and were convicted on nearly all the counts which went to the jury. The trial of this case lasted for one week and three of the chemists of this Department testified upon the case.

Upon the Governor's recommendation a new law was passed which is in part enforced by this Department. Under this law five cars of coal unfit for use were seized and were dumped by the railroad. A few piles in coal yards were seized. These piles were then sorted over by the owners and the coal unfit for ordinary use was then seized by this Department and disposed of. In one instance seven hundred tons were delivered to the city of Chelsea to be used for filling.

Examination of the coal complained of in the latter part of the fiscal year showed that it is a different material from what was complained of in the early part of the year.

Coal with an ash content as high as 30 per cent is very unusual and complaints have been made of coal with an ash content of 11 and 12 per cent. During the early part of the year the ash content of coal complained of varied between 30 and 53 per cent. This corresponded to the addition of from 28 to 61 per cent of non-combustible rock.

ARSPHENAMINE.

In the production of arsphenamine the laboratory has been able to furnish a supply sufficient to meet the demand. There has been distributed during the past fiscal year 46,498 doses computed as 0.6 gram per dose, in comparison with 39,339 doses during the previous fiscal year. The budget estimate of 1924 is based upon a probable demand for 60,000 doses.

In addition to the manufacture of arsphenamine research has been carried out

upon the manufacture of sulfarsphenamine, and beginning with June we have distributed 2,635 doses and the demand is at present greater than we can supply. The demand for sulfarsphenamine has apparently not cut down the increasing demand for arsphenamine.

Solutions of sulfarsphenamine can be more readily prepared by the ordinary physician than solutions of arsphenamine, which require considerable technical training. Physicians have been demanding sulfarsphenamine in individual doses rather more than they have been demanding arsphenamine. It is probable that the demand for sulfarsphenamine will increase at a greater rate than the demand for arsphenamine, due to its ease in administration, its lower toxicity, and apparently greater stability.

TABLE 1.

For Sale of Milk Not of Good Standard Quality.

NAME.	Address.	Court.	Date.	Result.
Andronicos, Angelo	West Springfield	Springfield	Nov. 8, 1923	Conviction.
Argeropoulos, Peter	Springfield	Springfield	Nov. 8, 1923	Conviction.
Collias, John	Pittsfield	Pittsfield	Nov. 27, 1923	Conviction.
Connos, Christi	Springfield	Springfield	April 4, 1923	Conviction.
Cosnes, George	Springfield	Springfield	Oct. 23, 1923	Conviction.
Farrah, Louis	Lawrence	Lawrence	July 6, 1923	Conviction.
Gavesar, Peter D.	Springfield	Springfield	Mar. 6, 1923	Conviction.
Gibbons, Fred F.	Framingham	Framingham	Mar. 12, 1923	Conviction.
Hanna, William	Springfield	Springfield	Nov. 8, 1923	Conviction.
Kupiec, Mary	Dudley	Southbridge	Aug. 3, 1923	Conviction. ¹
Mamolis, Christy	Springfield	Springfield	Nov. 8, 1923	Conviction.
Manuell, James	Springfield	Springfield	Nov. 8, 1923	Conviction.
Pechillis, Louis	Stoughton	Stoughton	Oct. 19, 1923	Conviction.
Pierce, George	Springfield	Springfield	Nov. 8, 1923	Conviction.
Porro, Thomas	Pittsfield	Pittsfield	Nov. 27, 1923	Conviction.
Solosck, Thomas W.	Southbridge	Southbridge	Aug. 3, 1923	Conviction. ¹
Tivman, Samuel	Springfield	Springfield	April 4, 1923	Conviction.
Tivman, Samuel	Springfield	Springfield	April 4, 1923	Conviction.
Yalinis, John K.	Springfield	Springfield	Mar. 6, 1923	Conviction.

For Sale of Milk from which a Portion of the Cream had been removed.

Barnett, Charles A.	Great Barrington	Great Barrington	Nov. 1, 1923	Conviction. ²
Bennett, Jr., Watson L.	State Line	Great Barrington	Nov. 1, 1923	Conviction.
Currier, Perley P.	Haverhill	Newburyport	Sept. 7, 1923	Discharged.
Di Comes, James	Pittsfield	Pittsfield	Nov. 16, 1923	Conviction. ³
Dyer, John B.	Truro	Provincetown	Aug. 22, 1923	Conviction.
Furtado, Marian	Swansea	Fall River	May 29, 1923	Discharged.
Helin, Hilma	Fitchburg	Fitchburg	May 16, 1923	Conviction.
Laitinen, Fanny	Fitchburg	Fitchburg	May 16, 1923	Conviction.
Marshall, Anton	Truro	Provincetown	Aug. 22, 1923	Conviction.
Mustanen, Michael	Fitchburg	Fitchburg	May 16, 1923	Conviction.
Puranen, Wilho	Fitchburg	Fitchburg	May 16, 1923	Conviction.

For Sale of Milk containing Added Water.

Almedia, Manuel	Dartmouth	New Bedford	Jan. 16, 1923	Conviction. ⁴
Bailot, Ferdinand F.	Cheshire	Adams	Oct. 18, 1923	Conviction. ⁵
Beaupre, Joseph	Acushnet	New Bedford	Jan. 16, 1923	Conviction.
Benevides, Antone	Swansea	Fall River	June 20, 1923	Conviction.
Bennett, Jr., Watson L.	State Line	Great Barrington	Nov. 1, 1923	Conviction.
Borgess, Manuel	Westport	Fall River	Jan. 19, 1923	Conviction.
Chace, Chas. H.	Swansea	Fall River	Mar. 22, 1923	Conviction.
Chapin, Mrs. Inez H.	Sterling	Clinton	April 24, 1923	Conviction.
Coutaubo, Joseph A. ⁶	Westport	Fall River	Aug. 28, 1923	Conviction.
Currier, Perley P.	Haverhill	Newburyport	Sept. 7, 1923	Conviction.
Currier, Perley P.	Haverhill	Newburyport	Sept. 7, 1923	Conviction.
Dean, Jos. B.	Adams	Adams	Nov. 23, 1923	Discharged.
Dias, Jr., Manuel J.	New Bedford	New Bedford	Mar. 2, 1923	Conviction.
Fournier, Alfred	Lawrence	Amesbury	Nov. 30, 1923	Conviction.
Frodyma, Frank	West Springfield	Springfield	July 20, 1923	Conviction.
Gorman, Michael	Abington	Abington	June 22, 1923	Discharged.
Gould, Leroy F.	Framingham	Cambridge	April 28, 1923	Conviction.
Gracie, John S.	South Dartmouth	New Bedford	Nov. 15, 1923	Conviction.
Hamel, Joseph	Lanesboro	Pittsfield	Aug. 24, 1923	Conviction.
Hamel, Joseph	Lanesboro	Pittsfield	Nov. 27, 1923	Conviction.
Hardy, Louis S.	Waltham	Newton	Sept. 26, 1923	Conviction.
Higgins, John L.	Wellfleet	Provincetown	Sept. 1, 1923	Conviction.
Iannacci, Nicolla	Woburn	Woburn	April 13, 1923	Conviction. ⁷
Kuken, John	Amesbury	Amesbury	July 31, 1923	Conviction.
Kuken, John	Amesbury	Amesbury	Aug. 31, 1923	Conviction. ⁸
Kuken, John	Amesbury	Amesbury	Oct. 1, 1923	Conviction. ⁹
Lakin, Wilber F.	West Quincy	Quincy	Nov. 19, 1923	Conviction.
Lotti, Clement	Southbridge	Southbridge	Nov. 23, 1923	Conviction.
Matti, Joseph F.	New Bedford	New Bedford	Jan. 16, 1923	Conviction.
May, Edgar	Canton	Stoughton	Sept. 14, 1923	Conviction.
Mayowski, Albert	So. Hadley Falls	Northampton	July 7, 1923	Conviction.
Nunes, Joseph A.	Somerset	Fall River	July 6, 1923	Conviction.
Olivera, Frank	Swansea	Fall River	Jan. 23, 1923	Conviction.
Owen, William	Westport	Fall River	Nov. 23, 1923	Conviction.
Packeco, Augustine	Swansea	New Bedford	Jan. 23, 1923	Conviction.
Smith, Ray	West Springfield	Springfield	Oct. 23, 1923	Conviction.
Szlosk, Valenti	Southbridge	Southbridge	Jan. 26, 1923	Conviction.
Toporoski, Joseph	East Cheshire	Adams	Nov. 9, 1923	Conviction. ⁵
Wallace, Lewis R.	Sudbury	Cambridge	Jan. 12, 1923	Conviction.

For Sale of Cream not of Good Standard Quality.

Brandon Farms Milk Company	East Cambridge	Waltham	Mar. 29, 1923	Discharged.
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¹ Continued for sentence.² Sentence suspended.³ Appealed.⁴ Appealed. ⁵ Fined \$50; sentence suspended.⁶ Samples submitted by Fall River Board of Health; analyses made by this Department.⁷ Continued for sentence. ⁸ Sentence suspended. ⁹ Fined \$200; sentence suspended.

For Sale of Ice Cream below Standard.

NAME.	Address.	Court.	Date.	Result.
International Ice Cream Company	Pittsfield	Pittsfield	Nov. 2, 1923	Discharged.
International Ice Cream Company	Pittsfield	Pittsfield	Nov. 2, 1923	Discharged.

*For Sale of Adulterated Foods other than Milk and Milk Products.***BUTTER. — (Low in fat.)**

Cudahy Packing Company	Lawrence	Lawrence	Oct. 8, 1923	Discharged.
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CIDER. — (Contained benzoic acid.)

Hannah, George	Lawrence	Lawrence	Dec. 1, 1922	Conviction.
Kaplan, Myer (2 counts)	Pittsfield	Pittsfield	Jan. 26, 1923	Conviction.
Midouhas, Peter (2 counts)	Haverhill	Lawrence	Dec. 11, 1922	Conviction.
Midouhas, Peter	Haverhill	Lowell	Dec. 22, 1922	Conviction. ¹

MAPLE SYRUP. — (Misbranded; contained cane sugar.)

Belleville, Elie	Dracut	Lowell	Mar. 19, 1923	Conviction.
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OLIVE OIL. — (Contained cottonseed oil.)

Cicalis, John	Boston	Boston	May 18, 1923	Conviction.
Papas, Arthur	Lynn	Lynn	June 27, 1923	Conviction.

OLIVE OIL. — (Misbranded.)

Armenis, George	Boston	Lawrence	June 29, 1923	Conviction.
Billitti, Vincinzi	Boston	Stoughton	June 28, 1923	Conviction.

SAUSAGE. — (Contained starch in excess of 2 per cent.)

Almond, David	Lowell	Lowell	Feb. 28, 1923	Conviction.
Baron, John (2 counts)	Fall River	Fall River	Jan. 16, 1923	Conviction.
Baron, John	Fall River	Fall River	Mar. 28, 1923	Discharged.
Baron, John (2 counts)	Fall River	Fall River	April 3, 1923	Conviction. ¹
Bartz, Frank	South Boston	South Boston	Jan. 15, 1923	Conviction.
Beauchamp, Ovilla	Holyoke	Springfield	Jan. 9, 1923	Conviction.
Borowick, Michael (2 counts)	Fall River	Fall River	Jan. 16, 1923	Conviction.
Borowik, Michael	Fall River	Fall River	Mar. 28, 1923	Discharged.
Borowik, Michael (2 counts)	Fall River	Fall River	Apr. 3, 1923	Conviction. ¹
Buba, Ludwig	Salem	Salem	Feb. 13, 1923	Dismissed. ²
Duclos, Joseph H. (2 counts)	Fall River	Fall River	April 3, 1923	Conviction. ¹
Eastern Provision Company, Inc. (2 counts)	Fall River	New Bedford	Jan. 11, 1923	Conviction.
Furneau, Henry	Lawrence	Lawrence	Nov. 5, 1923	Conviction.
Furneau, Henry J.	Lawrence	Lawrence	Nov. 5, 1923	Conviction.
Godek, Kazimirz	Holyoke	Holyoke	Dec. 7, 1922	Conviction.
Godek, Kazimirz	Holyoke	Holyoke	April 28, 1923	Conviction.
Godek, Kazimirz	Holyoke	Northampton	May 24, 1923	Conviction.
Greenberg, Louis	Attleboro	Attleboro	Feb. 4, 1923	Conviction.
Gritz, Michael	Adams	Adams	Mar. 9, 1923	Conviction. ¹
Jagodowski, Sylvester	Holyoke	Holyoke	May 16, 1923	Conviction.
Janik, Joseph P.	Chicopee	Holyoke	June 14, 1923	Conviction.
Kohn, Joseph	Salem	Salem	Feb. 13, 1923	Conviction.
Kotaski, Alexander	Salem	Salem	Feb. 13, 1923	Conviction.
Montniny, Adelard (2 counts)	Fall River	Fall River	April 3, 1923	Conviction. ¹
Morrison & Schiff, Inc.	Boston	Boston	Feb. 26, 1923	Conviction.
Moskal, John	Holyoke	Holyoke	Dec. 7, 1922	Conviction.
Moskal, John	Holyoke	Holyoke	May 16, 1923	Conviction.
Neuza, Herman	Adams	Adams	Mar. 9, 1923	Conviction. ³
Nowak, Wladyslaw	Holyoke	Holyoke	Dec. 7, 1922	Conviction.
Nowak, Wladyslaw	Holyoke	Holyoke	April 27, 1923	Conviction.
Nowak, Wladyslaw	Holyoke	Northampton	May 24, 1923	Conviction.
Palmer, Alexander	Salem	Salem	Feb. 13, 1923	Conviction.
Rodzick, Louis	Worcester	Worcester	Jan. 31, 1923	Conviction.
Rounsevell, Phillip W.	Boston	Fitchburg	Jan. 5, 1923	Conviction.
Ruether, Anton	Williamstown	Williamstown	Mar. 9, 1923	Conviction. ³
Rzeszotarski, John	Holyoke	Holyoke	May 16, 1923	Conviction.
Sichel Provision Company	Boston	Roxbury	April 4, 1923	Conviction.
Snigorski, John	Lawrence	Lawrence	Jan. 17, 1923	Conviction.
Swistak, John	Adams	Adams	Mar. 9, 1923	Conviction. ³
Taylor, Truelove	Milford	Milford	Feb. 23, 1923	Conviction.
Turgeon, Aldemar	Adams	Adams	Mar. 9, 1923	Conviction. ³
Weitz, Carl A. (2 counts)	Boston	Boston	Feb. 23, 1923	Conviction. ¹

¹ Appealed.² Defendant serving six months' jail sentence for another offence.³ Fined \$10; sentence suspended.

SAUSAGE. — (Contained coloring matter.) — Concluded.

NAME.	Address.	Court.	Date.	Result.
Baran, John . . .	Fall River . . .	Fall River . . .	Jan. 16, 1923 .	Conviction.
Borowick, Michael .	Fall River . . .	Fall River . . .	Jan. 16, 1923 .	Conviction.
Boston Sausage & Provision Company .	Boston . . .	Boston . . .	Feb. 15, 1923 .	Conviction. ¹
Colonial Provision Company, Inc. .	Boston . . .	Boston . . .	Sept. 10, 1923 .	Conviction. ¹
Eastern Provision Company, Inc. (2 counts) .	Fall River . . .	New Bedford . .	Jan. 11, 1923 .	Conviction.
Garber, Max . . .	Boston . . .	Waltham . . .	July 9, 1923 .	Conviction.
Gunsenhiser Company, Abram .	Boston . . .	Boston . . .	April 25, 1923 .	Conviction.
Epstein, Phillip . .	Boston . . .	Lawrence . . .	Jan. 17, 1923 .	Conviction.
Ruether, Anton . .	Williamstown . .	Williamstown . .	Mar. 9, 1923 .	Conviction. ²

SAUSAGE. — (Contained starch in excess of 2 per cent and contained coloring matter.)

Morrison & Schiff, Inc. .	Boston . . .	Boston . . .	Feb. 26, 1923 .	Conviction.
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SAUSAGE. — (Contained a compound of sulphur dioxide.)

Beaudoin, William . .	Holyoke . . .	Holyoke . . .	April 27, 1923 .	Conviction.
Godek, Kazimirz . .	Holyoke . . .	Holyoke . . .	Dec. 7, 1922 .	Conviction.
Heintz, Arno . . .	Easthampton . .	Northampton . .	June 7, 1923 .	Conviction.
Moskal, John . . .	Holyoke . . .	Holyoke . . .	Dec. 7, 1922 .	Conviction.
Nowak, Wladyslaw . .	Holyoke . . .	Holyoke . . .	Dec. 7, 1922 .	Conviction.
Riley, Joseph . . .	Holyoke . . .	Holyoke . . .	Dec. 7, 1922 .	Conviction.
Rzeszotarski, Michael .	Holyoke . . .	Holyoke . . .	Dec. 9, 1922 .	Conviction.
Tessier, Orphir . . .	Holyoke . . .	Holyoke . . .	April 27, 1923 .	Conviction.
Thivierge, George . .	Holyoke . . .	Holyoke . . .	May 16, 1923 .	Conviction.
Zasadzinski, John . .	Holyoke . . .	Holyoke . . .	Dec. 9, 1922 .	Conviction.

SCALLOPS. — (Contained added water.)

Folsom, Benjamin . .	Boston . . .	Roxbury . . .	Feb. 6, 1923 .	Conviction.
Haley, Austin F. . .	Boston . . .	Boston . . .	Dec. 6, 1922 .	Discharged.
Rowe, Frank . . .	Boston . . .	Boston . . .	Dec. 6, 1922 .	Discharged.
Sullivan, Arthur . . .	Boston . . .	Boston . . .	Dec. 6, 1922 .	Discharged.

VINEGAR. — (Made otherwise than by fermentation.)

Massachusetts Preserves Company . . .	Boston . . .	Boston . . .	Mar. 21, 1923 .	Conviction.
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EGGS. — Decomposed; unfit for food.

Bloom, Edward . . .	Newburyport . .	Newburyport . .	Feb. 14, 1923 .	Discharged.
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False Advertising. — Sale of Eggs which were not Fresh as Fresh Eggs.

Albany Cash Market, Inc. .	Pittsfield . . .	Pittsfield . . .	Jan. 26, 1923 .	Discharged.
Brown, Benjamin . . .	Quincy . . .	Quincy . . .	Nov. 26, 1923 .	Conviction.
Brown, Charles H. . .	Norwood . . .	Dedham . . .	Dec. 13, 1922 .	Conviction.
Cooper, Nathan . . .	Norwood . . .	Dedham . . .	Dec. 13, 1922 .	Conviction.
Filion, Arthur . . .	Mansfield . . .	Attleboro . . .	Dec. 29, 1922 .	Conviction.
First National Stores, Ltd. .	Springfield . . .	Springfield . . .	Feb. 20, 1923 .	Conviction.
Prouski, Konstantino . .	Springfield . . .	Springfield . . .	Nov. 8, 1923 .	Conviction.

EGGS. — continued. Selling Cold-Storage Eggs as Fresh Eggs.

Jenks, Phillip W. . .	Pittsfield . . .	Pittsfield . . .	Jan. 26, 1923 .	Conviction.
George, Ellis . . .	North Adams . .	North Adams . .	Feb. 2, 1923 .	Conviction.

Misbranded.

Gold, David . . .	Springfield . . .	Springfield . . .	Feb. 20, 1923 .	Conviction.
Mosher, Arthur H. . .	Springfield . . .	Springfield . . .	Dec. 14, 1922 .	Conviction.
Mosher, Henry J. . .	Springfield . . .	Springfield . . .	Dec. 14, 1922 .	Conviction.
O'Keefe, M., Inc. . .	Norwood . . .	Dedham . . .	Dec. 13, 1922 .	Conviction.
Rudnick, Joseph . . .	Springfield . . .	Springfield . . .	Feb. 20, 1923 .	Conviction.
Shawmut Egg Company . .	Boston . . .	Fall River . . .	Dec. 12, 1922 .	Discharged.
Shawmut Egg Company . .	Boston . . .	Fall River . . .	Dec. 12, 1922 .	Discharged.
Theberge, A. Emel . . .	Fall River . . .	Fall River . . .	Dec. 12, 1922 .	Discharged.

Selling Cold-Storage Eggs Without Marking the Container.

Brien, Joseph . . .	North Adams . .	North Adams . .	Feb. 2, 1923 .	Conviction.
Brown, Waldo B. . .	Gloucester . . .	Gloucester . . .	Feb. 5, 1923 .	Conviction.
Castone, Stephen . . .	Lawrence . . .	Lawrence . . .	Nov. 21, 1923 .	Conviction.
Charron, Frank . . .	North Adams . .	North Adams . .	Feb. 2, 1923 .	Conviction.
Corcoran, Fred . . .	Lowell . . .	Lowell . . .	Dec. 8, 1922 .	Conviction.
Corey, Wm. . . .	Lawrence . . .	Lawrence . . .	Nov. 21, 1923 .	Conviction.
Cory, Elias . . .	Lawrence . . .	Lawrence . . .	Dec. 1, 1922 .	Conviction.
Cramer, Louis . . .	North Adams . .	North Adams . .	Feb. 2, 1923 .	Conviction.
Crock, Rebecca . . .	Brocton . . .	Brocton . . .	Feb. 13, 1923 .	Conviction. ¹
Czaj, Michael . . .	Lawrence . . .	Lawrence . . .	Nov. 21, 1923 .	Conviction.
Desrosiers, William . .	Lawrence . . .	Lawrence . . .	Nov. 21, 1923 .	Conviction.
Dietlers, Sarah . . .	Brocton . . .	Brocton . . .	Feb. 13, 1923 .	Conviction. ¹
Fossillo, Michael . . .	Newburyport . .	Newburyport . .	Jan. 24, 1923 .	Conviction.
George, Ellis . . .	North Adams . .	North Adams . .	Feb. 2, 1923 .	Conviction.
George, Joseph . . .	Gloucester . . .	Gloucester . . .	Feb. 5, 1923 .	Conviction.

¹ Appealed.² Fined \$10; sentence suspended.

EGGS. — Selling Cold-Storage Eggs Without Marking the Container. — Concluded.

NAME.	Address.	Court.	Date.	Result.
Gigliotti, Dominick	Pittsfield	Pittsfield	Jan. 26, 1923	Conviction.
Goodman, Max	Pittsfield	Pittsfield	Jan. 26, 1923	Conviction.
Gordon, Clarence A.	Fitchburg	Fitchburg	Jan. 5, 1923	Conviction. ¹
Hesse, Christopher	Pittsfield	Pittsfield	Jan. 26, 1923	Conviction.
Hubbard, Clarence E.	Westfield	Westfield	Dec. 7, 1922	Conviction. ¹
Intelisano, Antonio	Pittsfield	Pittsfield	Jan. 26, 1923	Conviction.
Jenks, Phillip W.	Pittsfield	Pittsfield	Jan. 26, 1923	Conviction.
Joseph, Michael E.	Pittsfield	Pittsfield	Jan. 26, 1923	Conviction.
Kenyon, John H.	Springfield	Springfield	Nov. 8, 1923	Conviction.
Kiminsky, Morris	Springfield	Springfield	Nov. 8, 1923	Conviction.
Klevs, Daniel	Springfield	Springfield	Nov. 8, 1923	Conviction.
Korkorian, Sarkis	Newburyport	Newburyport	Jan. 24, 1923	Conviction.
Kronick, Henry	North Adams	North Adams	Feb. 2, 1923	Conviction.
Kronick, Wm.	North Adams	North Adams	Feb. 2, 1923	Conviction.
Lappellano, Guisepppe	Lawrence	Lawrence	Nov. 21, 1923	Conviction.
Lerer, Harry	Lawrence	Lawrence	Jan. 17, 1923	Conviction.
Levine, David	Lawrence	Lawrence	Nov. 21, 1923	Conviction.
Lorigan, John	Lowell	Lowell	Dec. 8, 1923	Conviction.
Makor, George	Lawrence	Lawrence	Nov. 21, 1923	Conviction.
Massimiano, John	Pittsfield	Pittsfield	Jan. 26, 1923	Conviction.
Matta, Kalil	Gardner	Gardner	Jan. 5, 1923	Conviction.
Miringoff, Samuel	Lawrence	Lawrence	Nov. 21, 1923	Conviction.
Mroz, Michael	Lowell	Lowell	Dec. 8, 1922	Conviction.
Novick, Abraham	Lowell	Lowell	Dec. 8, 1922	Conviction.
Oulette, Emerile	Lawrence	Lawrence	Nov. 21, 1923	Conviction. ²
Peters, Jos.	Pittsfield	Pittsfield	Jan. 26, 1923	Conviction.
Phillips, A. H., Inc.	Springfield	Springfield	Nov. 8, 1923	Conviction.
Pierakos, Vailois	Lowell	Lowell	Dec. 8, 1922	Conviction.
Riccio, Angelo	Mansfield	Attleboro	Dec. 29, 1922	Conviction.
Roy, Max	North Adams	North Adams	Feb. 2, 1923	Conviction.
Sandra, Alfonzo	Lawrence	Lawrence	Dec. 11, 1922	Conviction.
Shaw, Frank	North Adams	North Adams	Feb. 2, 1923	Conviction.
Sherman, Arnold	Springfield	Springfield	Nov. 8, 1923	Conviction.
Silva, Joseph	Lowell	Lowell	Dec. 8, 1922	Conviction.
Simon, Milhem N.	Pittsfield	Pittsfield	Jan. 26, 1923	Conviction.
Thomas, Michael G.	Pittsfield	Pittsfield	Jan. 26, 1923	Discharged.
Torppa, John O.	Gardner	Gardner	Jan. 5, 1923	Conviction.
Williams, Richard F.	Westfield	Westfield	Dec. 7, 1922	Conviction. ¹
Zack, Morris	Lawrence	Lawrence	Nov. 21, 1923	Conviction.

For Sale of Decomposed Food. — PORK.

Labossiere, Gustave	Holyoke	Holyoke	June 27, 1923	Conviction.
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For Sale of Drugs Deficient in Strength. — EXTRACT OF JAMAICA GINGER.

Edner, Joseph	Boston	Boston	April 13, 1923	Conviction.
Elbaum, Leo L.	Boston	Boston	Feb. 7, 1923	Conviction.
Elbaum, Leo	Boston	Boston	July 17, 1923	Conviction.
Empire Spice Company, Inc.	Boston	Boston	April 6, 1923	Conviction.
Empire Spice Company, Inc.	Boston	Boston	April 18, 1923	Conviction.
Empire Spice Company, Inc. (2 counts) ³	Boston	Boston	July 17, 1923	Conviction. ²
Gitlin, Harry	Boston	Boston	July 10, 1923	Conviction.
Golberg, Myer	Boston	Boston	July 10, 1923	Conviction.
Gross, Harry	Boston	Boston	June 8, 1923	Conviction. ²
National Extract & Chemical Company	Boston	Boston	April 18, 1923	Conviction.
Reycroft, Louis W.	Cambridge	Cambridge	Mar. 24, 1923	Conviction. ²
Sedersky, Meyer (2 counts)	Boston	Boston	April 6, 1923	Conviction.
Shaw, David	Lawrence	Lawrence	June 19, 1923	Conviction. ⁴
Sulkin, Samuel L.	Boston	Boston	April 13, 1923	Conviction.
Western Refining Company, Inc.	Lowell	Lowell	April 30, 1923	Conviction.
Zion, Samuel	Boston	Boston	June 22, 1923	Conviction. ²

SPIRIT OF NITRE.

Reycroft, Louis W.	Cambridge	Cambridge	Mar. 24, 1923	Conviction. ²
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For Violation of the Laws Relative to Cold Storage. — HOLDING ARTICLES OF FOOD IN COLD STORAGE FOR A PERIOD LONGER THAN TWELVE MONTHS WITHOUT THE CONSENT OF THE DEPARTMENT OF PUBLIC HEALTH.

Wald, Louis	Roxbury	Boston	Nov. 16, 1923	Conviction.
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REPRESENTING COLD-STORAGE FOOD AS FRESH FOOD.

Filion, Arthur	Mansfield	Attleboro	Dec. 29, 1922	Conviction.
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¹ Continued for sentence.² Appealed. ³ One count dismissed.⁴ Fined \$10; sentence suspended.

For Violation of the Laws Relative to Slaughtering. — SLAUGHTERING OR AUTHORIZING SLAUGHTERING IN THE ABSENCE OF INSPECTOR.

NAME.	Address.	Court.	Date.	Result.
Baskin, Harry . . .	Adams . . .	North Adams . . .	Dec. 7, 1922 . . .	Conviction.
Brockoff, John . . .	Torrington, Conn. . .	Great Barrington . . .	Oct. 10, 1923 . . .	Conviction.
Downing, Otis N. . .	Mattapoisett . . .	Wareham . . .	Jan. 12, 1923 . . .	Conviction. ¹
Goodman, Hyman . . .	New Bedford . . .	Wareham . . .	Jan. 12, 1923 . . .	Conviction. ¹
Gruber, John . . .	Great Barrington . . .	Great Barrington . . .	April 3, 1923 . . .	Conviction.
Nager, Samuel . . .	Great Barrington . . .	Great Barrington . . .	April 3, 1923 . . .	Conviction.
Nager, Samuel . . .	Great Barrington . . .	Great Barrington . . .	April 3, 1923 . . .	Conviction. ²
Reid, James R. . . .	Wakefield . . .	Malden . . .	Mar. 27, 1923 . . .	Discharged.
Seibelli, Andrew . . .	Agawam . . .	Springfield . . .	Dec. 7, 1922 . . .	Conviction.

SELLING, OFFERING FOR SALE, OR HAVING IN POSSESSION WITH INTENT TO SELL, UNSTAMPED MEAT.

Barber, George E. . .	Winchester, N. H. . .	Greenfield . . .	Oct. 4, 1923 . . .	Conviction.
Cradleman, Harry . .	Greenfield . . .	Greenfield . . .	Jan. 11, 1923 . . .	Conviction.
Cradleman, Harry . .	Greenfield . . .	Greenfield . . .	Jan. 11, 1923 . . .	Conviction.
Cummings, Stowell . .	Cheshire . . .	Adams . . .	May 11, 1923 . . .	Conviction.
Eddy, Byron . . .	Woodstock, Conn. . .	Webster . . .	Jan. 16, 1923 . . .	Conviction.
Krugman, Abraham . .	West Springfield . . .	Springfield . . .	Dec. 7, 1922 . . .	Conviction.
Seibelli, Andrew . . .	Agawam . . .	Springfield . . .	Dec. 7, 1922 . . .	Conviction.
Sivestre, Angelina . .	Lawrence . . .	Lawrence . . .	April 24, 1923 . . .	Conviction.

SLAUGHTERING WITHOUT LICENSE.

Nager, Samuel . . .	Great Barrington . . .	Great Barrington . . .	April 3, 1923 . . .	Conviction.
Nager, Samuel . . .	Great Barrington . . .	Great Barrington . . .	Oct. 26, 1923 . . .	Conviction. ³
Nager, Samuel . . .	Great Barrington . . .	Great Barrington . . .	Oct. 26, 1923 . . .	Conviction.

AS INSPECTOR OF SLAUGHTERING STAMPED A CARCASS WHICH HE HAD NOT SEEN SLAUGHTERED.

Tuller, George A. . . .	Great Barrington . . .	Great Barrington . . .	April 10, 1923 . . .	Conviction.
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OBSTRUCTION OF INSPECTOR.

Cradleman, Harry . . .	Greenfield . . .	Greenfield . . .	Jan. 11, 1923 . . .	Discharged.
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ACCEPTING FEES ILLEGALLY.

Barden, Charles F. . . .	Agawam . . .	Springfield . . .	April 4, 1923 . . .	Quashed.
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VIOLATED RULES AND REGULATIONS OF DEPARTMENT OF PUBLIC HEALTH.

Randall, Josiah	Mattapoisett . . .	Wareham . . .	Jan. 12, 1923 . . .	Discharged.
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For Violation of Mattress Laws.

Black, Abraham D. . . .	Worcester . . .	Worcester . . .	Oct. 24, 1923 . . .	Conviction. ¹
Black, Abraham D. . . .	Worcester . . .	Worcester . . .	Oct. 24, 1923 . . .	Conviction. ¹
Gladstone, Harry . . .	Malden . . .	Malden . . .	Sept. 19, 1923 . . .	Conviction.
Goldfine, Samuel . . .	Pittsfield . . .	Pittsfield . . .	Sept. 26, 1923 . . .	Conviction.
Kimball, Benjamin L. . .	Springfield . . .	Springfield . . .	May 18, 1923 . . .	Conviction.
National Mattress Company . . .	Boston . . .	Boston . . .	Sept. 18, 1923 . . .	Conviction.
Pearlman, Morris . . .	Pittsfield . . .	Pittsfield . . .	Sept. 26, 1923 . . .	Conviction.
Rotstein, Frank . . .	Boston . . .	Boston . . .	April 12, 1923 . . .	Conviction.
Rubin, Jacob . . .	New Bedford . . .	New Bedford . . .	April 27, 1923 . . .	Conviction.
Rubin, Julius . . .	New Bedford . . .	New Bedford . . .	April 27, 1923 . . .	Conviction.
Sachs, Albert . . .	New Bedford . . .	New Bedford . . .	April 27, 1923 . . .	Conviction.
Shlager, Saul . . .	Malden . . .	Malden . . .	Sept. 19, 1923 . . .	Conviction.
Spanner, William J. . .	Springfield . . .	Springfield . . .	Mar. 15, 1923 . . .	Conviction. ⁴
Taylor, Samuel . . .	New Bedford . . .	New Bedford . . .	Apr. 27, 1923 . . .	Conviction.
Weiner, Israel . . .	Boston . . .	Fitchburg . . .	May 29, 1923 . . .	Conviction. ¹
Weiner, Samuel . . .	Boston . . .	Fitchburg . . .	May 29, 1923 . . .	Conviction. ¹
White Star Mattress Company . . .	Chelsea . . .	Chelsea . . .	Mar. 6, 1923 . . .	Conviction. ¹

TABLE 2. — *Composition of Milk Samples Examined. — (Milk Solids, Per Cent.)*
Fiscal Year Ending Nov. 30, 1923.

	15 and Above.	14.	13.	12.	11.	10.	9.	8.	Below 8.	Totals.
1922										
December	1	1	17	177	33	10	14	4	—	257
1923										
January	1	2	14	85	32	6	7	2	—	149
February	1	5	33	204	50	4	—	—	—	297
March	8	13	67	265	54	13	4	2	—	426
April	3	11	81	416	111	15	7	—	—	644
May	5	9	71	396	205	25	2	—	—	713
June	2	13	64	363	179	11	4	1	—	637
July	5	30	96	254	103	17	6	—	4	515
August	2	13	83	322	249	43	5	6	—	723
September	2	10	64	362	187	13	1	—	—	639
October	5	13	57	352	148	20	3	5	24	627
November	1	13	73	307	116	29	3	3	2	547
Totals	36	133	720	3,503	1,467	206	56	23	30	6,174
Per cent of total . . .	0.58	2.15	11.77	56.78	23.76	3.33	0.91	0.37	.048	

¹ Appealed.

² On file, without finding.

³ Sentence suspended.

⁴ Continued for sentence.

TABLE 3. — *Summary of Milk Samples Examined.* — Fiscal Year Ending Nov. 30, 1923.

	Above Standard.	Below Standard.	Total Samples.	Cream Removed.	SKIMMED NOT MARKED.		Watered Samples.	AVERAGE OF ALL SAMPLES.			Number of Samples.	AVERAGE OF GOOD SAMPLES.		
					Above Stand- ard.	Below Stand- ard.		Solids.	Fat.	Solids Not Fat.		Solids.	Fat.	Solids Not Fat.
1922														
December .	196	61	257	7	-	-	28	12.11	3.54	8.57	222	12.40	3.65	8.75
1923														
January .	102	47	149	2	-	-	20	12.08	3.63	8.45	127	12.41	3.74	8.67
February .	243	54	297	9	-	-	-	12.54	3.70	8.84	288	12.57	3.73	8.84
March .	353	73	426	5	-	-	16	12.53	3.74	8.79	405	12.95	3.87	9.08
April .	511	133	644	17	1	1	7	12.42	3.73	8.69	618	12.47	3.77	8.70
May .	481	232	713	24	-	-	29	12.27	3.70	8.57	660	12.32	3.74	8.58
June .	442	195	637	12	-	2	6	12.28	3.64	8.64	617	12.33	3.67	8.66
July .	385	130	515	23	-	-	20	12.46	3.78	8.68	472	12.93	3.95	8.98
August .	420	303	723	35	-	-	28	12.13	3.69	8.44	660	12.27	3.79	8.48
September .	438	201	639	19	-	-	17	12.27	3.68	8.59	603	12.34	3.73	8.61
October .	427	200	627	10	-	-	53	12.08	3.74	8.34	564	12.50	3.88	8.62
November .	394	153	547	11	-	-	48	12.29	3.76	8.53	488	12.53	3.86	8.67
	4,392	1,782	6,174	174	1	3	272	12.29	3.69	8.60	5,724	12.50	3.78	8.72

TABLE 4. — *Summary of Food Samples Examined.*

CHARACTER OF SAMPLE.	Genuine.	Adulterated.	Total.
Butter .	98	44	142
Cider .	4	5	9
Coffee .	1	-	1
Condensed Milk .	-	3	3
Cream .	12	3	15
Eggs .	142	170	312
Flavoring extracts .	17	2	19
Fish .	4	-	4
Ice cream .	8	1	9
Jams .	6	1	7
Maple sugar .	8	9	17
Maple syrup .	8	4	12
Mayonnaise and salad dressings .	19	-	19
Meat products .	820	136	956
Miscellaneous foods .	26	5	31
Liquor .	1	-	1
Nuts .	4	1	5
Olive oil .	60	19	79
Pickles .	1	-	1
Scallops .	10	1	11
Soft drinks .	53	-	53
Spices .	9	1	10
Vinegar .	61	12	73
Miscellaneous samples .	-	-	-
Mattress fillings .	3	5	8
Totals .	1,375	422	1,797

TABLE 5. — *Summary of Drug Samples Examined.*

CHARACTER OF SAMPLE.	Genuine.	Adulterated.	Total.
Alcohol .	1	-	1
Camphorated oil .	16	2	18
Hydrogen peroxide .	1	-	1
Linseed oil .	5	-	5
Magnesium citrate solution .	8	3	11
Miscellaneous drugs .	34	-	34
Proprietary drugs .	2	-	2
Spirit of camphor .	27	4	31
Spirit of nitrous ether .	97	31	128
Spirit of peppermint .	4	2	6
Tincture of ginger (double strength) .	30	38	68
Tincture of iodine .	1	-	1
Totals .	226	80	306

TABLE 6. — *Summary of Liquor Samples Examined.*

	Beer.	Cider.	Wines.	Dis- tilled Liquors.	Flavor- ing Ex- tracts.	Alcohol.	Miscel- laneous.	Total	
								1923.	1922
Boston . .	148	5	82	1,990	4	259	91	2,579	2,654
Cambridge . .	28	—	88	447	4	59	20	646	406
Lowell . .	197	2	15	342	1	43	18	618	429
Lynn . .	7	1	13	150	1	15	9	196	158
Fall River . .	11	2	2	175	—	3	2	195	196
Somerville . .	14	1	12	125	—	27	9	188	205
Springfield . .	3	—	—	166	—	5	1	175	75
Lawrence . .	11	1	13	85	—	33	4	147	229
Gloucester . .	3	—	16	37	1	21	1	79	48
Fitchburg . .	25	7	3	19	—	25	—	79	38
Milford . .	40	—	4	23	—	2	—	69	36
Malden . .	9	—	5	37	—	2	2	55	53
Beverly . .	8	1	29	14	1	1	—	54	14
Ayer . .	—	22	7	16	7	1	—	53	41
Newton . .	—	—	23	25	2	2	—	52	32
Everett . .	2	—	2	37	—	—	1	42	10
Quincy . .	2	—	4	25	—	4	4	39	16
Peabody . .	7	—	2	24	—	—	1	34	2
Leominster . .	13	4	1	6	—	10	—	34	16
Marlboro . .	8	1	2	18	—	3	—	32	14
Brookline . .	1	—	8	16	—	3	2	30	37
Woburn . .	2	—	4	19	—	3	1	29	12
Norwood . .	8	—	5	15	—	—	—	28	47
Winchendon . .	9	—	3	11	—	3	—	26	1
Ipswich . .	3	—	8	10	—	2	2	25	35
Waltham . .	1	—	2	16	—	4	—	23	17
Chelsea . .	2	—	1	19	—	—	—	22	27
Pittsfield . .	6	5	1	9	—	1	—	22	17
Hudson . .	3	1	6	6	—	1	3	20	34
Haverhill . .	11	2	—	5	—	1	1	20	23
Dedham . .	—	—	3	17	—	—	—	20	17
New Bedford . .	20	—	—	—	—	—	—	20	—
Miscellaneous ¹ .	144	51	72	358	20	61	10	716	—
Totals . .	746	106	436	4,262	41	594	182	6,367	5,766

¹ From 101 cities and towns submitting less than 20 samples during the year.

Summary.

Requests for extension of time granted, 72. Butter, 1; poultry, 8; game, 7; meat, 18; fish, 38.

Requests for extension of time not granted, 7. Eggs, 1; butter, 1; meat, 1; fish, 4.

Articles ordered removed from storage (no requests made), 78. Eggs, 2; butter, 1; poultry, 15; game, 8; meat, 39; fish, 13.

TABLE 7. — *Requests for Extension of Time Granted on Goods in Cold Storage from December 1, 1922, to December 1, 1923.* — (Reason for such extension being that goods were in proper condition for further storage.)

ARTICLE.	Weight (Pounds).	Placed in Storage.	Extension Granted to	Name.
Butter	60	July 22, 1922	Nov. 1, 1923	Hunneman, William C.
Chickens	—	Aug. 30, 1922	Nov. 30, 1923	Eastman, Frank B.
Chickens	—	Aug. 30, 1922	Nov. 30, 1923	Eastman, Frank B.
Chickens	6,888	Dec. 15, 1921 ¹	Jan. 26, 1923	Hosmer, F. H., Co.
Chickens	789	Nov. 29, 1922	Jan. 15, 1924	Spinney, W. J.
Chickens	4,810	Nov. 29, 1922	Jan. 15, 1924	Spinney, W. J.
Fowl	1,800	Nov. 6, 1922	Jan. 6, 1924	Eastman, Frank B.
Fowl	620	Nov. 29, 1922	Jan. 15, 1924	Spinney, W. J.
Turkeys	498	Mar. 29, 1922	May 28, 1923	Eastman, Frank B.
Deer	210	Nov. 21, 1922	Jan. 31, 1924	Armstrong, David B.
Deer	192	Nov. 8, 1922	Mar. 8, 1924	Keating, John J.
Deer	127	Nov. 17, 1922	Jan. 1, 1924	Miers, C. J.
Deer meat	25	Nov. 7, 1922	May 2, 1924	Wells, Charles G.
Geese	996	July 11, 1922	Nov. 11, 1923	Eastman, Frank B.
Pigeons	850	Aug. 14, 1922	Nov. 14, 1923	Batchelder & Snyder Co.
Venison	20	Nov. 4, 1922	Dec. 31, 1923	Thompson, Albert W.
Beef loins	1,480	April 12, 1922	May 12, 1923	Swift & Company.
Beef loins	2,390	July 27, 1922	Sept. 27, 1923	Swift & Company.
Hogs	2,370	May 15, 1922	Aug. 15, 1923	Lyman School for Boys.
Hogs	2,317	May 16, 1922	Aug. 15, 1923	Lyman School for Boys.
Pork loins	20,434	Dec. 2, 1922	Feb. 15, 1924	Batchelder & Snyder Co.
Pork loins	7,754	Dec. 4, 1922	Feb. 15, 1924	Batchelder & Snyder Co.
Pork loins	8,098	Dec. 4, 1922	Feb. 15, 1924	Batchelder & Snyder Co.
Pork loins	8,783	Dec. 4, 1922	Feb. 15, 1924	Batchelder & Snyder Co.
Pork loins	11,363	Dec. 4, 1922	Feb. 15, 1924	Batchelder & Snyder Co.
Pork loins	18,258	Dec. 4, 1922	Feb. 15, 1924	Batchelder & Snyder Co.
Pork loins	5,803	Dec. 5, 1922	Feb. 15, 1924	Batchelder & Snyder Co.
Pork loins	7,567	Dec. 5, 1922	Feb. 15, 1924	Batchelder & Snyder Co.
Pork loins	10,220	Dec. 5, 1922	Feb. 15, 1924	Batchelder & Snyder Co.
Pork loins	23,285	Dec. 5, 1922	Feb. 15, 1924	Batchelder & Snyder Co.
Pork loins	15,000	Aug. 7, 1922	Oct. 30, 1923	Poole, J. R., Company.
Pork loins	8,000	June 29, 1922	Aug. 1, 1923	Sears, Al., Company.
Pork loins	3,100	June 14, 1922	Aug. 1, 1923	Sears, Al., Company.
Veal legs	440	Dec. 21, 1922	Jan. 15, 1924	Swift & Company.
Eels	2,700	Dec. 27, 1921	Feb. 1, 1923	Corso & Cannizzo.
Halibut	890	Sept. 15, 1922	Dec. 31, 1923	Neal, J. R., Company.
Halibut	46,960	Dec. 24, 1921	Mar. 15, 1923	New England Fish Co.
Halibut	345	April 17, 1923	Jan. 17, 1923	Prior & Townsend.
Herring	1,440	Oct. 1, 1922	Jan. 1, 1924	Gloucester Fresh Fish Co.
Herring ²	1,800	July 19, 1922	Oct. 19, 1923	Harding, F. E., Company.
Mackerel, Canadian	2,327	Feb. 27, 1923 ³	Dec. 31, 1923	Gloucester Fresh Fish Co.
Mackerel, Canadian	4,027	Feb. 27, 1923 ³	Dec. 31, 1923	Gloucester Fresh Fish Co.
Mackerel	1,250	June 6, 1922	Dec. 5, 1923	Arnold & Winsor Company.
Mackerel	100	Jan. 18, 1923 ³	Nov. 1, 1923	Atlantic & Pacific Fish Co.
Mackerel	110	Jan. 18, 1923 ³	Nov. 1, 1923	Atlantic & Pacific Fish Co.
Mackerel	420	Jan. 18, 1923 ³	Nov. 1, 1923	Atlantic & Pacific Fish Co.
Mackerel	770	Jan. 18, 1923 ³	Nov. 1, 1923	Atlantic & Pacific Fish Co.
Mackerel	1,700	Jan. 18, 1923 ³	Nov. 1, 1923	Atlantic & Pacific Fish Co.
Mackerel	2,380	Jan. 18, 1923 ³	Nov. 1, 1923	Atlantic & Pacific Fish Co.
Mackerel	11,760	Jan. 18, 1923 ³	Nov. 1, 1923	Atlantic & Pacific Fish Co.
Mackerel	600	Feb. 27, 1923 ³	Nov. 27, 1923	Atlas Fish Company.
Mackerel	1,680	Sept. 29, 1922	Dec. 31, 1923	Atwood & Company.
Mackerel	4,320	Dec. 15, 1922	Dec. 31, 1923	Atwood & Company.
Mackerel	7,250	July 15, 1922	Nov. 15, 1923	Batchelder & Snyder Co.
Mackerel	2,040	June 29, 1922	Aug. 29, 1923	Carr, Thomas A.
Mackerel	575	Sept. 23, 1922	Dec. 23, 1923	Corso & Cannizzo.
Mackerel	2,400	June 29, 1923 ³	Dec. 31, 1923	Desmond, W. D., Company.
Mackerel	12,240	Aug. 1, 1922	Dec. 31, 1923	Desmond, W. D., Company.
Mackerel	5,112	June 5, 1922	Dec. 1, 1923	Fairburn, Geo. C.
Mackerel	1,770	June 14, 1922	Dec. 1, 1923	Fairburn, Geo. C.
Mackerel	1,300	June 12, 1922	Dec. 12, 1923	Fearney, John F.
Mackerel	2,650	June 6, 1922	Sept. 3, 1923	Foley, M. F., Company.
Mackerel	874	Oct. 30, 1922	Dec. 31, 1923	Harding, F. E., Company.
Mackerel	300	July 4, 1922	Nov. 4, 1923	Henry & Close Company.
Mackerel	1,800	Aug. 1, 1922	Feb. 1, 1924	Henry & Close Company.
Mackerel	3,840	Aug. 1, 1922	Feb. 1, 1924	Henry & Close Company.
Mackerel	4,920	Aug. 1, 1922	Dec. 31, 1923	O'Leary, R. & Sons.
Mackerel	16,200	Aug. 1, 1922	Dec. 31, 1923	O'Leary, R. & Sons.
Mackerel	17,000	June 8, 1922	Dec. 31, 1923	Sudhalter, A.
Salmon	430	Oct. 10, 1922	Nov. 10, 1923	Atlantic & Pacific Fish Co.
Salmon	1,156	Nov. 15, 1922	Feb. 15, 1924	Henry & Close Company.
Salmon	151	Aug. 28, 1922	Jan. 1, 1924	Shattuck & Jones.

¹ Date of storage in the West.² Bait.³ Previously stored elsewhere.TABLE 8. — *Requests for Extension of Time Not Granted on Goods in Cold Storage from December 1, 1922, to December 1, 1923.*

ARTICLE.	Weight (Pounds).	Placed in Storage.	Name.
Egg whites	5,160	July 19, 1921	Layton, John, Company, Inc.
Butter	780	June 5, 1922	Goldsmith, Stockwell Company.
Beef loins	1,091	June 30, 1922	Swift & Company.
Lobster meat	15	June 13, 1922	Union Lobster Company.
Lobster meat	20	June 13, 1922	Union Lobster Company.
Mackerel	615	June 5, 1922	Prior & Mahoney.
Mackerel	1,974	June 5, 1922	Prior & Mahoney.

TABLE 9. — *Articles which had been in Cold Storage Longer than Twelve Months, and on which No Requests for Extension had been Made, Ordered Removed, from December 1, 1922, to December 1, 1923.*

ARTICLE.	Weight (Pounds).	Placed in Storage.	Name.
Eggs	880	May 1922	Layton, John, Company.
Eggs	1,920	May 1922	Layton, John, Company.
Butter	20	June 9, 1922	Green & Company.
Chickens	1,650	Oct. 12, 1921	Armour & Company.
Chickens	950	Nov. 26, 1921	Armour & Company.
Chickens	30	Jan. 7, 1922	Bowker, George.
Chickens	61	Jan. 20, 1922	Dempsey, J. F.
Chickens	500	Nov. 26, 1921	Forbes & Wallace.
Chickens	165	June 8, 1922	Hodder, W. W., Company.
Chickens	78	Nov. 30, 1921	Lawrence, H. L.
Chickens	1,500	Dec. 19, 1921	Littlefield, J. F.
Chickens	142	Nov. 29, 1921	McCabe, M. J.
Chickens	358	Sept. 21, 1922	Osgood, C. H.
Turkeys	34	Dec. 29, 1921	Genoa Cafe.
Turkeys	10	Nov. 25, 1921	Shattuck, Dr. S. S.
Ducks	100	Nov. 22, 1921	Dold, Jacob.
Ducks	7	Nov. 7, 1921	Edson, Ralph B.
Fowl	150	Dec. 28, 1921	Armour & Company.
Game	260	Feb. 6, 1922	Rounds, George E.
Moose meat	40	Sept. 27, 1921	Barr, W. G.
Venison	30	Nov. 23, 1921	Barr, W. G.
Venison	34	Dec. 20, 1921	Davis, Harry A.
Venison	63	Dec. 20, 1921	Denning, Dr.
Venison	20	May 3, 1922	Lillemoen, C. A.
Venison	74	Dec. 7, 1921	Russell, B. F. W.
Venison	80	Nov. 8, 1921	Wesson, V. H.
Beef	943	April 11, 1922	Blackstone Supply Company.
Beef	400	April 15, 1922	Blackstone Supply Company.
Beef	750	Oct. 28, 1922	Endicott Provision Company.
Beef	90	Aug. 14, 1922	Wald, L.
Beef	120	Oct. 10, 1922	Wald, L.
Beef	165	Oct. 10, 1922	Wald, L.
Beef chucks	600	June 20, 1922	Industrial School for Girls.
Beef chucks	1,600	Mar. 24, 1922	Mindick, M., Company.
Beef hearts	77	May 12, 1922	Ho der, W. W.
Beef kidneys	25	May 22, 1922	Hodder, W. W.
Beef livers	1,000	Aug. 18, 1922	Doyle & Company.
Beef livers	300	Aug. 9, 1922	Roundsvell, P. W.
Beef loins	814	June 24, 1922	Swift & Company.
Beef loins	200	June 30, 1922	Swift & Company.
Beef quarters	1,000	April 7, 1922	Blackstone Supply Company.
Beef ribs	87	Nov. 9, 1921	Blackstone Beef Company.
Beef shoulder clods	1,800	Oct. 16, 1921	Sears, Alfred, Company.
Frogs' legs	70	April 12, 1922	Turco, George.
Hogs	939	April 10, 1922	Lyman School for Boys.
Lamb	1,100	Nov. 18, 1921	Blackstone Supply Company.
Luncheon Meat	350	Oct. 13, 1922	Mohawk Packing Company.
Meat	5	Jan. 9, 1922	Packard, W. D.
Mutton	90	Aug. 16, 1922	Boston Provisions & Ship Supply Co.
Mutton	126	April 11, 1922	Hodder, W. W.
Oxtails	1,034	July 29, 1922	Cudahy Packing Company.
Pigs' brains	200	Dec. 20, 1921	Mohawk Packing Company.
Pigs' feet	250	Feb. 2, 1922	Model Market, Inc.
Pigs' hocks	129	Nov. 10, 1921	Cavanaugh, W. H.
Pigs' livers	100	Feb. 4, 1922	Model Market, Inc.
Pork	60	May 29, 1922	Blackstone Supply Company.
Pork	100	June 28, 1922	Cowan Brothers.
Pork	521	Aug. 11, 1922	Hawkins, L. T.
Pork loins	140	July 1, 1922	Blackstone Supply Company.
Pork loins	800	July 1, 1922	Blackstone Supply Company.
Pork loins	808	July 29, 1922	Blackstone Supply Company.
Pork trimmings	2,016	Aug. 18, 1922	Balkus, N.
Pork trimmings	3,100	Oct. 1, 1922	Maggioli, N.
Sirloin butts	10,000	July 30, 1921	Independent Packing Company.
Sweetbreads	5	May 10, 1921	Tabor, George S.
Capons	22	Jan. 31, 1922	Veasey, A. D.
Herring ¹	1,400	Mar. 19, 1922	Nicholson, T. M.
Herring ¹	1,280	April 3, 1922	Nicholson, T. M.
Lobster meat	32	July 14, 1922	Union Lobster Company.
Mackerel	615	June 10, 1922	Bristol Public Market.
Mackerel	1,500	June 10, 1922	Calnan, E.
Mackerel	1,575	June 2, 1922	Franklin Square Market.
Mackerel	680	June 3, 1922	Globe Fish Company.
Mackerel	692	June 27, 1922	Prime Fish Company.
Mackerel	160	June 8, 1922	Whitman, Ward & Lee.
Shad	210	Sept. 14, 1922	Shaw Fish Company.
Smelts	75	Dec. 10, 1921	Corso & Cannizzo.
Sole	265	Oct. 11, 1922	Gloucester Fresh Fish Company.

¹ Bait

TABLE 10. — *Articles other than Fish placed in Cold Storage from December 1, 1922, to December 1, 1923.*

	Butter (Pounds).	Eggs (Dozens).	Broken- out Eggs (Pounds).	Broilers (Pounds).	Roasters (Pounds).	Fowls (Pounds).	Turkeys (Pounds).	Miscella- neous Poultry (Pounds).	Beef (Pounds).	Pork (Pounds).	Lamb and Mutton (Pounds).	Miscella- neous Meats (Pounds).
December	.	1,377,661	405,680	68,494	1,932,941	884,780	724,584	870,307	360,382	3,083,832	261,632	1,493,662
January	.	1,396,501	484,020	56,595	1,748,975	879,704	1,124,023	675,527	430,206	6,255,944	913,848	1,284,792
February	.	749,012	134,680	81,407	948,760	537,406	95,223	291,271	274,592	4,192,045	52,732	988,359
March	.	519,554	72,968	25,317	138,598	272,858	92,774	138,744	540,746	3,220,718	287,564	1,224,394
April	.	527,629	7,075,470	492,799	403,298	94,233	29,760	172,782	609,967	2,767,792	16,358	1,181,147
May	.	753,589	10,409,610	972,810	31,085	539,860	120,556	118,571	871,512	1,570,925	22,964	1,150,453
June	.	8,641,949	4,633,920	67,904	36,336	230,898	80,330	181,739	697,372	2,198,425	148,854	972,278
July	.	1,683,750	519,443	53,129	111,259	378,677	70,158	205,424	429,703	2,257,308	87,396	1,283,760
August	.	3,698,005	623,100	179,602	28,574	165,623	9,236	116,717	609,994	1,702,845	107,212	1,185,288
September	.	3,179,568	487,100	130,550	206,045	119,814	47,489	190,141	223,553	1,575,009	81,464	930,447
October	.	2,193,155	501,150	167,493	220,450	452,474	24,526	345,027	559,806	1,741,677	53,393	1,045,269
November	.	1,402,879	567,690	85,342	119,832	922,387	402,844	348,453	1,336,165	2,478,841	122,321	1,093,341

TABLE 10. — *Fish placed in Cold Storage from December 1, 1922, to December 1, 1923.*

	Bluefish (Pounds).	Butter- fish (Pounds).	Ciscoes, (Pounds).	Cod Hake Pollock and Haddock (Pounds).	Halibut (Pounds).	Herring (Pounds).	Mackerel (Pounds).	Fall and Silver Salmon (Pounds).	Salmon, all Other (Pounds).	Shad (Pounds).	Smelts, Eula- chan, etc. (Pounds).	Squid (Pounds).	White- fish (Pounds).	Whiting (Pounds).	Miscella- neous Frozen Fish (Pounds).
December	—	13,637	36,117	31,056	108,660	320,233	196,238	109,091	35,049	3,995	6,604	89,827	25,644	42,673	88,236
January	687	15,241	33,724	28,010	106,449	318,338	210,348	165,223	69,116	3,900	10,295	23,803	—	96,891	52,542
February	1,688	11,489	545	21,709	53,855	123,700	173,322	107,931	19,550	1,440	17,550	41,537	—	22,318	56,579
March	—	—	—	1,207	12,744	8,615	63,712	173,312	66,218	3,155	2,327	—	—	—	8,631
April	—	—	—	29,140	13,516	917,825	126,980	10,390	49,368	7,642	1,185	17,730	—	—	91,359
May	955	3,450	3,625	34,682	87,786	556,652	218,629	2,497	51,744	—	—	834,180	—	112,540	306,115
June	10,103	62,097	15,890	30,685	105,246	406,336	879,261	33,531	174,374	14,968	—	125,185	5,220	1,042,245	303,756
July	3,060	47,992	12,435	239,048	147,136	461,255	276,660	3,305	45,974	1,330	—	95,800	4,350	2,346,388	398,947
August	315	4,875	500	71,015	93,282	197,600	1,739,915	1,897	77,161	—	—	21,290	4,350	1,603,703	597,365
September	60	5,920	2,500	200,037	32,043	404,987	1,185,286	62,384	33,562	1,607	3,608	37,103	20,300	735,586	308,267
October	115	4,545	1,220	45,092	339,316	502,585	117,343	55,882	42,840	—	3,883	12,151	26,762	241,055	298,048
November	60	3,225	51,550	151,388	280,005	368,121	71,767	110,292	30,810	30	22,039	58,643	9,895	33,100	249,359

TABLE 11. — *Articles other than Fish on hand in Cold Storage on the First day of the month from January 1, 1922, through December 1, 1923.*

	Butter (Pounds).	Eggs (Dozens).	Broken- out Eggs (Pounds).	Broilers (Pounds).	Roasters (Pounds).	Fowls (Pounds).	Turkeys (Pounds).	Miscella- neous Poultry (Pounds).	Beef (Pounds).	Pork (Pounds).	Lamb and Mutton (Pounds).	Miscella- neous Meats (Pounds).
January	.	5,869,984	2,909,010	1,108,985	2,637,849	1,057,939	502,617	1,384,259	2,269,532	3,519,034	784,277½	2,676,589
February	.	2,626,086	757,830	868,324	4,164,959	1,821,222	1,453,899	1,865,498	1,998,919	8,980,942	1,531,739	2,688,307
March	.	1,606,105	26,040	660,734	4,710,033	2,003,132	1,384,242	1,922,348	1,766,385	12,330,742	1,458,754	2,757,873
April	.	560,863	592,710	406,107	4,006,662	1,760,900	1,304,772½	1,671,755	1,983,778	14,377,696	1,597,328	3,117,976
May	.	223,161	6,624,390	628,394	3,362,903	1,177,216	1,199,773	1,474,218	1,474,498	15,129,430	1,458,460	2,849,984
June	.	420,123	16,137,990	1,261,520	3,355,277	830,659	1,101,617	1,126,758	2,408,821	14,012,448	1,727,474	4,229,247
July	.	7,739,180	19,883,820	1,717,403	2,995,874	1,027,159	1,074,327	1,019,888	4,881,734	13,150,367	716,486	2,925,928
August	.	14,236,999	20,065,590	2,062,253	2,731,466	1,383,788	1,010,550	967,388	1,837,483	11,674,005	389,190	2,773,192
September	.	14,684,132	18,680,280	2,002,648	247,952	489,067	823,509	874,578	1,537,709	9,601,342	292,907	2,684,090
October	.	14,805,884	16,574,310	1,873,985	389,623	233,717	390,590	789,036	1,143,844	8,268,004	323,073	2,271,815
November	.	12,347,372	12,955,050	1,714,954	582,578	389,857	482,569	911,202	1,223,721	3,072,995	289,380	1,935,321
December	.	9,487,418	9,102,240	1,489,734	671,324	1,196,580	633,431	1,130,312	2,106,084	4,288,265	389,929	2,140,373

TABLE 11. — *Fish on hand in Cold Storage on the Fifteenth day of the month, from January 15, 1922, through December 15, 1923.*

	Bluefish (Pounds).	Butter- fish (Pounds).	Ciscoes, (Pounds).	Cod Hake Pollock and Haddock (Pounds).	Halibut (Pounds).	Herring (Pounds).	Mackerel (Pounds).	Fall and Silver Salmon (Pounds).	Salmon, all Other (Pounds).	Shad (Pounds).	Smelts Eula- chan, etc. (Pounds).	Squid (Pounds).	White- fish (Pounds).	Whiting (Pounds).	Miscella- neous Frozen Fish (Pounds).
January	2,806	59,079	155,550	33,336	305,387	1,223,500	1,834,522	237,068	123,793	23,427	7,418	98,051	23,178	1,862,692	389,619
February	1,817	26,665	130,180	11,965	257,755	1,109,040	1,097,441½	181,298	137,288	16,297	4,555	51,747	9,973	705,169	166,219
March	2,536	6,457	62,244	14,221	116,809	687,795	644,972	176,246	111,018	5,271	11,056	43,110	6,893	47,517	98,089
April	1,799	5,945	15,182	12,891	74,497	88,805	237,378	154,938	135,526	4,359	4,976	17,927	5,923	3,526	47,880
May	384	120	—	5,151	23,283	759,172	190,113	18,113	129,874	1,318	2,582	27,811	—	23	81,680
June	—	2,370	625	24,675	38,587	1,067,305	311,418	10,315	82,500	2,043	2,237	853,875	—	112,540	346,894
July	4,478	64,269	14,415	40,440	105,507	1,457,046	1,160,313	15,326	136,113	13,559	2,114	928,082	4,470	830,518	599,136
August	4,650	115,896	26,155	275,411	171,784	1,815,000	1,348,857	13,333	131,094	14,839	2,023	931,820	3,760	2,797,955	942,954
September	4,965	118,358	25,894	323,529	231,217	1,916,194	3,024,356	10,989	174,880	14,541	1,843	842,076	7,458	4,063,998	1,423,588
October	3,093	121,424	26,779	504,750	249,160	2,018,745	3,972,426	56,822	177,738	15,983	1,540	771,379	21,860	4,506,560	1,403,509
November	1,517	111,603	24,779	531,928	502,937	1,989,888	3,365,295	74,752	201,906	15,005	9,210	599,705	43,467	4,406,088	1,251,394
December	272	64,152	74,324	616,972	683,305	1,678,028	2,577,517	135,179	184,057	14,101	28,002	483,010	49,022	3,645,754	1,049,364

Summary of Bakery Inspections.

Number of such bakeries inspected	210
Floors not properly constructed or maintained	65
Walls not properly constructed or maintained	59
Ceilings not properly constructed or maintained	49
Storage facilities not properly constructed or maintained	7
Apparatus not properly constructed or maintained	23
Stock not properly protected	40
Products not properly protected	76
Flies abundant	11
Flour storage unsatisfactory	32
Tobacco used in bakery	10
Absence of garbage can	41
Domestic rooms connected with bakery	2
Miscellaneous defects	59

Report of Division of Communicable Diseases

B. W. Carey, M.D., *Director*.

The reported incidence of the diseases declared to be dangerous to the public health for the year 1923 has been constantly high month by month, the total morbidity being 98,421 with a mortality totalling 8,706.

Scarlet fever with 12,300 cases in particular was unduly prevalent during the year, there being 56 per cent more cases than were reported during the previous year. The type of infection, however, was much milder than previously experienced, giving us a fatality rate of but 1.3. This very mildness, however, proves to be the main factor in its wide-spread incidence. Time and time again during the routine school examinations pupils were found desquamating who gave the history of but slight indispositions, so slight in fact that no one had even thought of the possibility of the condition being scarlet fever. Under such circumstances measures of quarantine and isolation could not be effectively applied, and the infection spread through contact until in some communities it became a small-sized outbreak. However, once the prevalence of the disease was discovered in any given community school physicians and nurses became active, and through daily school inspection and home visitation, quickly brought the school age group under control. The pre-school age group was not so readily handled and furnished the foci for the continued spread throughout the community. There does not appear to have been a single outbreak traced to any other source than personal contact.

Measles again exceeded the reported incidence of a year ago by over 3,500 cases with many more deaths. When it is considered that in the past four years the total number of cases of this condition reported has exceeded 100,000, and that more than 900 deaths have occurred, the seriousness of this infection must be realized. While the cases occurring in children under five years of age are about 25 per cent of the total number reported, we note that 76 per cent of the deaths that have resulted were in this same age group.

Whooping cough presents much the same picture with a much lessened incidence. However, the total number of cases for the year reached 10,612 with 493 deaths, giving the greatest morbidity and mortality that we have ever had from this condition except in 1918 when our reports were confused and perhaps incorrect because of the influenza epidemic. Here again the greatest loss of life is noted in the pre-school age group.

In reviewing the failure to control or prevent these three conditions, certain facts appear to be clearly set forth. First: The most helpless age is the period when infection from these conditions is most serious — a time when parents must act for their children because the children cannot act for themselves. Second: The vast bulk of infection of these three diseases is to be found transmitted directly by personal contact. Indeed, history of very intimate personal contact appears almost always to be present. Third: Inasmuch as these infections are most prevalent in the pre-school age group which is without supervision, we ought to prevent their dissemination from the infected school child to this group by properly directed effort within the schools. To offset these evident facts and to give emphasis to certain fundamentals which have been often stated, we must intensify our educational program which must clearly outline to parents their course of action when certain important conditions exist in the children under their control, namely (1) that they should be suspicious of colds in children under five years of age; (2) that these colds should be treated seriously until they are sure that no infectious disease is present; (3) that proper precautions should be taken with these children as though each cold was actually the beginning of an infectious disease; and (4) that they should protect their neighbor's child even as they would have their own child protected by keeping at home their children who show slight evidence of an infection of this type.

The reported incidence for diphtheria exceeds that of the previous year, with the number of cases and deaths being respectively 9,018 and 579. Were it not for the present active diphtheria campaign and the efficiency of the available

methods of prevention and control, this state of affairs would well be disheartening. However, with the splendid results which have attended the efforts of the communities which have maintained a steady preventive campaign we have every reason to believe that the immediate future is particularly bright.

An effective program for diphtheria control must be carried out under four general headings: (1) *Prevention*. True prevention of diphtheria can best be secured through the immunization of all who are found to be susceptible to infection. This can be procured through the use of the Schick test followed by the use of the toxin-antitoxin mixture and by the immediate immunization of persons in contact with an active case. The progress made in our diphtheria prevention campaign is to be seen in the following list of communities where they are maintaining clinics or have put on campaigns:

Permanent Clinics. District No. 1. Attleboro, Bourne, Fall River, Falmouth and New Bedford.

District No. 2. Ashland, Boston, Braintree, Bridgewater, Brockton, Brookline, Cambridge, Cohasset, Framingham, Hingham, Milton, Newton, Norwood, Quincy, Walpole, Wellesley, and West Bridgewater.

District No. 3. Lynn and Salem.

District No. 4. Lawrence and Lowell.

District No. 6. Amherst, Enfield, Greenwich, Hadley, Northampton and Wilbraham.

District No. 7. North Adams.

Campaigns. District No. 1. Barnstable, Middleboro, Plymouth, Taunton and Yarmouth.

District No. 2. Abington, Avon, Marlboro, Natick, Stoughton, Weymouth and Wrentham.

District No. 3. Amesbury, Chelsea, Danvers, Everett, Haverhill, Ipswich, Malden, Melrose, Merrimac, Middleton, Nahant, North Reading, Peabody, Reading, Revere, Saugus, Swampscott, West Newbury and Winthrop.

District No. 4. Andover, Maynard, Methuen, Wilmington and Woburn.

District No. 5. Clinton, Fitchburg, Leominster, Millbury, Oxford, Westboro, Winchendon, Worcester.

District No. 6. Chicopee, Easthampton, Hatfield, Holyoke, Palmer, Springfield, Ware, Westfield and Williamsburg.

District No. 7. Adams, Becket, Dalton, Erving, Florida, Greenfield, Hancock, Lee, Monterey, Orange, Stockbridge and Tyringham.

Immunization of other inmates of households harboring an active case has not shown, statistically at least, any great improvement over the amount done in the years that we have been conducting this special study. In 1922 the number of cases bearing the same family name at the same address, or with the same street address but a different name, was 1,973, while in 1923 there were 2,422 such cases. Inasmuch as these secondary cases form such a large percentage of the total incidence of diphtheria, special attention is demanded and it would appear that physicians, boards of health and parents in particular, should have knowledge of this danger and of the means whereby it may be avoided. Because of the fact that a physician was in attendance on the primary case and gave immediate treatment to the secondary case as it developed, the mortality rate for the secondary infections was lower. In 1922 the mortality rates were primary, 4.4, secondary, 2.6; in 1923 the rates were primary cases, 4.3, secondary, 1.0.

The methods now generally employed by local boards of health for the isolation and quarantine of patient and for culturing patient and other members of the family for release afford ample evidence of the part which they play in the prevention of additional cases and in controlling the spread of the infection.

(2) *Diagnosis*. More and more is it evident that the laboratory is used for the differential diagnosis of the various infections of the throat. This is a great improvement and one which should produce very definite results in our campaign. To illustrate the increased use of the laboratory (taking the year 1915 when the total incidence was comparable to that reported this year) we find that the number of laboratory examinations for the diagnosis of diphtheria made in our State laboratory increased from 10,509 in 1915 to 21,563 in 1923. The rates for these same two periods compared as follows: 1915, morbidity rate (per 100,000), 250.4;

mortality rate, 19.4; fatality rate, 7.8. 1923, morbidity rate, 227.2; mortality rate, 14.6; fatality rate, 6.4. Inasmuch as the main reliance has been placed on the same agencies, that is diagnosis and antitoxin, for control of this condition it would appear that the laboratory through furnishing early diagnosis has contributed largely to the improved condition, for with the early diagnosis comes the earlier administration of antitoxin and it is believed more adequate dosage.

(3) *Treatment.* It has been known for years back that the early administration of antitoxin with adequate dosage has a direct effect on the death rate of this condition and from evidence quoted below it is to be noted that the physicians throughout the State as a whole are now utilizing a larger amount of antitoxin. This can only mean that the educational program directed towards the proper use of antitoxin is bearing very definite results. In 1915, with 9,282 cases, 151,745 doses of 1,000 units of antitoxin were distributed. In 1923, with 9,018 cases, 411,507 1,000-unit doses were distributed.

Smallpox was reported in the last month of the year. A case which became ill in Adams and went to New York was diagnosed there as smallpox. As soon as notice was received every effort was made to vaccinate all contacts. Four cases subsequently occurred in the family with which the original case had boarded.

Typhoid Fever. The continued decrease through the Commonwealth of typhoid fever has been the source of very great satisfaction to this Division for this persistent decrease is not the result of haphazard effort, but rather has resulted from the well directed and persistent effort of the public health workers in the various communities of the Commonwealth. To realize the number of lives which have been saved this year one has only to look back ten years and find that four times as many people died as in this year. (Number of deaths in 1913, 280; 1923, 70.) The measures which have made this reduction possible in the early days of our public health work still continue to be needed. In fact, with the improper disposal of sewage or the contamination of water supply an immediate increase of the incidence of typhoid fever is to be noted. However, in addition to these protective engineering measures with the subsequent safeguarding of water supply, epidemiological investigation, the discovery and proper supervision of the typhoid carrier and the use of the prophylactic vaccine have all proven to be effective agents in lowering the incidence of this disease. It appears that we are now approaching an incidence of typhoid fever which might well be termed residual, that is, the incidence of the disease for some time to come will be about that reported for this year. This, if true, calls for even greater activity in our control measures than has been present in the past. Constant surveillance of water supply, more careful epidemiological study of the sporadic case, close supervision of the known carriers, and proper isolation of the patient with proper treatment of excreta and careful after-care all are of importance if we are to completely control typhoid fever in this Commonwealth.

Lobar Pneumonia furnishes one of our major problems. The reported morbidity for a five-year period reaches an average of 4,835 with the average deaths for the same period 2,387. The one reportable disease exceeding these figures was pulmonary tuberculosis.

Year.	LOBAR PNEUMONIA.		PULMONARY TUBERCULOSIS.	
	Per Cent of all Deaths.	Per Cent of Reported Cases.	Per Cent of all Deaths.	Per Cent of Reported Cases.
1919	5.0	57.0	8.1	60.3
1920	5.3	51.1	7.0	56.0
1921	3.8	44.7	6.9	53.0
1922	4.6	45.1	6.2	56.9
1923	4.4	48.6	5.9	57.4

A fatality percentage of 45, year after year, in lobar pneumonia has produced a certain feeling of fatalism toward this condition among the profession and laity alike. Much discussion has recently been raised over the efficacy of typing sputum and the use of the serum in treatment of Type I pneumonia. No evidence is at hand which can definitely prove the various points of contention. There is, however, one fact shown and that is that Type I serum to be effective must be given early in the disease. Preventive efforts thus far have been centered around the

production of an efficacious vaccine and it is reported that certain of the New York authorities have perfected and are now experimenting with such a vaccine. There could be no question but a vaccine of this type would be of inestimable value, ranking in importance with the typhoid prophylactic. Perhaps of more importance because of its wider application will be the development of a practical plan for the observance of the common rules of personal hygiene.

Pulmonary Tuberculosis. A decline in both morbidity and mortality is to be noted again for this disease. The rate of decline has advanced and with the projects now started for intensive school work it would appear that the momentum given to this activity should be greatly increased. The case rate per 100,000 population has shown a steady decrease in the past five years—from 181.9 in 1919, to 134.9 in 1923, the death rate for the same period being 110.0 for 1919, to 77.1 in 1923. The fatality rate ranges from 60.5 to 57.2.

During the year a study has been started of the deaths from pulmonary tuberculosis which have occurred during the last fifty years.

YEAR.	Under 5 Years.		5-9 Years.		10-14 Years.		15-19 Years.		20-29 Years.		30-39 Years.		40 Years and Over.		Un- known.		Total.
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	
1870	166	158	19	22	26	68	161	303	575	783	426	496	900	883	4	13	5,003
1880	131	129	17	28	21	61	172	362	702	977	471	574	916	903	6	4	5,494
1890	130	132	22	37	22	95	197	323	792	948	609	635	942	894	3	10	5,790
1900	96	109	19	30	22	71	172	254	737	826	656	578	905	724	0	0	5,199
1910	75	57	9	19	18	43	128	176	586	615	640	488	1026	623	0	0	4,503
1920	52	56	12	15	18	45	108	177	436	554	466	391	924	495	1	0	3,750

A marked lessening in the number of deaths in the age groups under 5, 5-9, and 15-19, especially in the female group; a decrease in male and female 20-29; an increase in male and decrease in female 30-39, with the 40 and over group increasing for the male and decreasing for the female is to be noted. The decline of deaths from pulmonary tuberculosis is even more noticeable when we consider the percentage of pulmonary deaths at specific ages with the total deaths from all causes at the same specific age. In 1870 we find that 18.3 per cent of all deaths that occurred in the Commonwealth were due to pulmonary tuberculosis, and with each decade since then for a period of fifty years a consistent decrease in this percentage has been noted. A study of the percentage in each age group finds the decrease present in each group:

	Under 5 Years.		5-9 Years.		10-14 Years.		15-19 Years.		20-29 Years.		30-39 Years.		40 Years and Over.		Total
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	
1870	3.1	3.5	4.6	5.3	10.1	22.8	37.1	51.1	45.2	48.5	41.2	40.1	18.6	18.1	18.3
1880	2.3	2.3	2.3	3.8	7.5	18.5	38.4	55.1	48.5	53.5	37.6	39.1	13.8	12.7	15.5
1890	1.7	2.1	3.5	5.7	6.7	25.6	31.3	44.1	41.4	47.1	34.9	35.1	10.5	9.2	10.8
1900	1.1	1.5	2.8	4.5	6.9	20.2	29.2	45.5	38.7	41.5	31.7	29.4	8.0	5.9	10.1
1910	.8	.8	1.5	3.7	4.9	13.7	24.7	36.4	33.2	39.2	29.2	25.6	7.2	4.3	8.3
1920	.8	1.1	2.0	2.9	4.9	14.2	23.4	35.9	29.4	30.8	24.6	19.3	6.1	3.1	7.0

Further studies of this should be made with an effort towards correlating the actual decline of tuberculosis with the measures that have been instituted for its prevention and control, and also to see just what has happened in the various communities of the State.

The work of the District Health Officers in so far as routine procedures and requirements are concerned has continued along the same general lines as in past years. Our special programs, however, have required more and more time—indeed at times long and arduous hours most ungrudgingly given have been necessary to convince communities of the worth-whileness of campaigns. Particularly is this true in the diphtheria prevention campaign. Here we met with the insidious propaganda of misinformed people making it exceedingly difficult to enlist the cooperation of local authorities that was needed for a successful campaign. The fact that the proposed number of communities originally thought of as to be the maximum which would adopt this program has already been exceeded speaks well for the industry of the field force. The development of the tuberculosis program with the special project of the examination clinic has also called for a great deal of time. Both the District Health Officers and Nursing Assistants have entered into this campaign whole-heartedly and have laid the foundation for a successful campaign which must result in the early detection of tuberculosis in childhood.

The routine inspections of hospitals, jails and dispensaries or clinics for licensing have been made as follows: Hospitals, 223; jails, lock-ups, etc., 175; dispensaries, 84.

The amount of time given to consultation with physicians and for the diagnosis of communicable disease appears to have been in excess of that necessary in former years. With no record available of the amount of time spent in this type of work no statistical table can be prepared, but we are sure from the increasing demands received through the central office for such service that it is in excess of previous years and bids fair to become one of the major projects for the District Health Officer.

The radio talks under the supervision of Dr. Miner were continued well into the year. A change of management of the broadcasting station brought forth a change of program which made it necessary for Dr. Miner to withdraw from the work. This in many ways is to be regretted, yet appears to have been unavoidable under the circumstances.

The cooperation of local authorities and our field force has been marked and in many communities has resulted in definite evidence of progress.

The Nursing Assistants have continued to faithfully perform their allotted tasks and have been of material assistance to the District Health Officer in the various programs of the Department; especially have they been active in the diphtheria prevention and tuberculosis programs.

The following changes in personnel have taken place:

Everett, Madeline C., appointed as Social Service Worker in the Subdivision of Venereal Diseases, July 9, 1923.

Hitchcock, Pauline D., appointed as Assistant Bacteriologist, July 1, 1923.

Shattuck, George C., M.D., appointed as Collaborating Epidemiologist, December 1, 1922.

The venereal disease program has continued along the same lines as in the past. A few new projects have been tried and have proven successful.

The distribution of bichloridol and the new arsenic product, sulfarsphenamine, to clinic chiefs and physicians of the larger hospitals has proven a great success. The sulfarsphenamine appears to be particularly useful because of the simplicity of its administration. It is hoped that the manufacturing process may be speeded up so that we may be able to put this product in the hands of the general practitioner. This will prove to be a very great advancement in the treatment of syphilis because of the lessened toxicity with freedom from reactions, together with simple technique of administration, giving the drug intravenously, intramuscularly, or even subcutaneously, and apparently possessing equal therapeutic value as arsphenamine or neoarsphenamine.

The reported incidence of gonorrhea and syphilis remained about the same as in former years, there being 4,885 cases of gonorrhea and 1,891 cases of syphilis reported.

The follow-up work in connection with sources of infection and cases lapsed from treatment continues to yield satisfactory results, and our program to extend this type of work in communities maintaining a clinic, while it has but started, appears to be welcomed as an addition to the clinic work and should when thoroughly established prove to be of great value as a stimulus to the more adequate treatment given at the State Approved Clinics.

Two pieces of work have caused a great deal of satisfaction to this Division. The effort directed toward the education of the druggist against selling medicine used for self-medication and certain quack remedies advertised for the cure of gonorrhea and syphilis has been most successful. Great credit must be given to those conscientious men who voluntarily took such medicine from their shelves and disposed of it. If the physicians who are dispensing medicine will cooperate as heartily and as fully with the pharmacist as he is willing to do with them, a much higher standing of both professions will result.

The courts of the State have been again visited and their cooperation sought in procuring proper examination and treatment for the prisoners before the Court who are possibly venereally infected. Hardly without exception this cooperation has been obtained and a perfect understanding as to our aims developed.

Contact with the social service workers, women's clubs, and public health

nurses and teachers throughout the State has been made, and every opportunity which offered itself for the presentation of our program has been seized. It appears, however, that further educational activity should be developed.

REPORT OF THE WORK OF THE BACTERIOLOGICAL LABORATORY.

The following is the report of the work of the bacteriological laboratory for the fiscal year December 1, 1922, to November 30, 1923:

Diphtheria — 21,563 examinations. Diagnosis, 1,622 positive, 12,835 negative. Release, 2,153 positive, 4,953 negative.

Tuberculosis — 4,735 examinations; 1,207 positive, 3,528 negative.

Typhoid Fever (Widal test) — 1,594 examinations; 304 positive, 1,260 negative, 30 atypical.

Typhoid Fever (Culture test) — 831 examinations; 82 positive, 749 negative.

Malaria — 86 examinations; 2 positive, 84 negative.

Gonorrhea — 2,653 examinations; 418 positive, 2,235 negative.

Pneumonia — 579 examinations.

Miscellaneous — 338 examinations.

Total number of examinations made, 32,379.

The following gives the total number of biologic products and diagnostic outfits distributed during the year ending Nov. 30, 1923:

Diphtheria Antitoxin — 7,589 vials of 1,000 units each; 24,241 vials of 3,000 units each, or 72,723 1,000-unit doses; 30,625 vials of 5,000 units each, or 153,125 1,000-unit doses; 17,807 vials of 10,000 units each, or 178,070 1,000-unit doses; total, 411,507 1,000-unit doses.

Antimeningococcic Serum — 4,609 vials of 15 c.c. each.

Antipneumococcic Serum — 336 bottles of 100 c.c. each, Type I.

Schick Toxin — 5,875 outfits of 50 doses each, or 293,750 doses; 170 c.c. bulk.

Vaccine Virus (Smallpox) — 197,767 doses.

Toxin-Antitoxin Mixture — 33,129 ampoules of 1 c.c. each; 141,460 c.c. bulk; total, 174,589 doses.

Bacterial Vaccine (Typhoid-paratyphoid) — 21,106 ampoules of 1 c.c. each; 39,870 c.c. bulk; total, 60,976 doses.

Normal Serum — 7,670 c.c.

Silver Nitrate Solution — 59,546 ampoules.

Diagnostic Outfits — 27,034 diphtheria culture outfits; 6,662 tuberculosis sputum outfits; 697 pneumonia sputum outfits; 2,135 Widal outfits; 1,259 typhoid culture outfits; 2,154 malaria-gonorrhea outfits.

REPORT OF THE SUBDIVISION OF VENEREAL DISEASES.

Incidence. The number of cases in the infectious state reported by number for the last three years is as follows:

1921 — Gonorrhea, 5,563; syphilis, 2,497.

1922 — Gonorrhea, 4,973; syphilis, 1,933.

1923 — Gonorrhea, 4,885; syphilis, 1,891.

Inasmuch as efforts have been made to stimulate reporting and the fact that the number of new cases admitted to the clinics is slightly on the decline, it may mean that the control measures by the Massachusetts Department of Public Health in cooperation with the U. S. Public Health Service are showing results.

Considerable more publicity by lectures, exhibits, films, slides and literature has been conducted over last year; 60 lectures were given as against 14 in 1922, while 26,528 pamphlets were distributed as against 18,113 in 1922.

Clinics. Five additional treatment centers have been added to our list of subsidiary clinics. In addition to the 18 State Approved Clinics, 26 Subsidiary Clinics are making monthly reports and generally cooperating with the Department. More treatment centers are contemplated and the date of opening the Board of Health Clinic at the Cambridge City Hospital has been arranged for January 4, 1924.

The number of new patients and total treatments at the various clinics for the past three years is as follows:

1921 — New patients: State Approved Clinics (18), 6,218; Subsidiary Clinics (8), 286; total, 6,504.

Total treatments: State Approved Clinics, 127,461; Subsidiary Clinics, 8,238; total, 135,699.

1922 — New patients: State Approved Clinics (18), 5,559; Subsidiary Clinics (21), 983; total, 6,542.

Total treatments: State Approved Clinics, 112,460; Subsidiary Clinics, 49,049; total, 161,509.

1923 — New patients: State Approved Clinics (18), 5,068; Subsidiary Clinics (26), 964; total, 6,032.

Total treatments: State Approved Clinics, 105,065; Subsidiary Clinics, 52,813; total, 157,878.

Undoubtedly the efficiency of many of the clinics could be improved by social service and the number of treatments per patient could be increased, but on the whole the clinics are functioning very well. The total treatments have fallen by 3,631, while the amount of arsphenamine used has increased by 552.

Therapeutic Measures. The need of an arsenical preparation more applicable for use by the general practitioner has been felt since the introduction of arspfenamine. From the available reports sulfarsphenamine seemed to fill all the requirements, being comparatively non-toxic, freely soluble in a small quantity of water, faintly acid and not requiring neutralization, and capable of being administered subcutaneously, intramuscularly or intravenously. The manufacture of this preparation by the State Arsphenamine Laboratory was recommended and a product for trial was available in June. The manufacture is not as difficult as that of arsphenamine and is more economical inasmuch as most of the product made passes the pharmacological tests. Arsphenamine made but classed as too toxic for use has been converted into safe sulfarsphenamine.

The product was at first distributed to a few clinics for therapeutic tests, but a general demand by other clinics and private physicians was soon made and has steadily increased. To date but 3,737 doses, based on 0.6 gram doses, have been given out. It is yet early to say just where in the armamentarium for luetic treatment this preparation stands.

Eight hundred seventy-seven ampoules of neoarsphenamine bought for special case use at the Children's Hospital, Massachusetts General Hospital, and Massachusetts Hospital School were paid for by this Department.

Forty-two thousand eight hundred forty-three doses of arsphenamine, based on 0.6 gram doses were distributed, this being 760 doses more than last year.

Bichloridol has become quite popular, 12,800 collapsules having been given out to the clinics during the year.

Social Service. During the past year the social service has continued its publicity and educational program, interesting special groups, State and other organizations with the social side of the venereal disease program. Many contacts have been made, the most noteworthy probably being the parent-teachers' groups, schools of social work at Simmons and Smith colleges, the League of Women Voters, and the City Federation of Women's Clubs. Many more requests for special investigations, as well as investigations of sources of infection, have come to the Department showing good cooperation with the social agencies in the State.

Standardization of the State Approved Clinics was started in Springfield where approximately 200 patients were written to and visited in an attempt to have them return to the clinic. The value of this work was shown by a letter received from the chief of the clinic. A considerable number of patients who had had but one or more treatments were induced to return to the clinic, and the fact that a small charge could be made in a great many cases to help support the clinic, was satisfactorily demonstrated to the hospital authorities. Undoubtedly some type of social service, either full or part time, will be instituted in the near future at this clinic.

The Department was fortunate in securing the services of Miss Mary E. Driscoll for a period of three months previous to Miss Madeline C. Everett coming to the Department in July as a full-time permanent social worker.

Over 200 investigations have been made as follows: Sources of infection, 53; lapsed cases, 25; arrangements for medical treatment, 23; returned patients to clinic, 116; total, 227.

One thousand six hundred nineteen lapsed cases were reported, 183 more than

last year. The number returned to treatment was 578, 169 more than last year.

Four boards of health (Boston, Cambridge, Chelsea and Worcester) have agreed to investigate sources of infection in their areas, with apparently good results.

Courts. Every police, district and municipal court, as well as most of the penal institutions, has been visited during the past year. An exceptionally good spirit has now been established between officials of these institutions and our Department. Cooperation has been good and repeated visits to some courts have improved the efficiency of the work. The former rather common excuse of lack of laws for inactivity of various courts regarding sex offenders is not now made.

Druggists. The campaign started last year against proprietary and quack remedies has been continued with surprising success; practically all druggists when acquainted with our desires have willingly cooperated. Six hundred forty-seven druggists in 17 cities and 133 towns have been visited, and so-called remedies listed at several thousands of dollars have been voluntarily destroyed or removed.

Quarterly Conferences. Two quarterly conferences of clinic chiefs and specialists in venereal diseases were held this year, one at the Psychopathic Hospital and one at the Boston City Club. They were well attended. Some of the papers have been published and it might be well to have all the proceedings of these meetings published and reprints available for distribution to physicians who are interested in the diagnosis and treatment of venereal diseases but who are unable to attend the conferences.

Educational Measures. During the year both social workers and special investigators have given talks and shown exhibits, slides or films. This phase of the work is being developed and with contemplated addition of modern films more work along these lines will be done during next year.

Jan. 1, 1923, to Dec. 31, 1923.

Cases reported by number:

Gonorrhea	4,885
Syphilis	1,891
	<hr/>
Cases reported by name (lapsed cases)	6,776
Lapsed cases returned to treatment	1,619
Arsphenamine distributed, figured on 0.6 gram doses	578
Sulfarsphenamine distributed, figured on 0.6 gram doses ¹	42,843
Mercury (Bichloridol) distributed, collapsules	3,737
Neosarsphenamine distributed, ampoules	12,800
Wassermann examinations	877
Smear examinations ²	57,652
Pamphlets distributed	2,690
Lectures	26,528
Normal Sodium Hydroxide Solution, bottles distributed	60
Drug stores visited in 17 cities and 133 towns	38
	647

REPORT OF EPIDEMIOLOGIST FOR 1923.

Prevalence of Infectious Diseases.

The year 1923 has been marked by an increased general prevalence of the common contagious diseases. This has been especially noted in scarlet fever and whooping cough, both of which have established new records for the number of cases reported.

In twenty-four instances outbreak notices were sent or special investigations initiated by District Health Officers. These are listed by months below. It will be noted that the great majority of so-called outbreaks are due to diseases which are transmitted directly from person to person without the intervention of any medium such as water, milk or food. It is these directly transmitted diseases which are least susceptible to control, and which now cause the great preponderance of incapacity and mortality due to infectious diseases.

¹ Distributed first in June, 1923.

² Refers only to smear examinations made in State Laboratory. Each clinic examines smears also.

Outbreak Notices and Special Investigations Reported during the Fiscal Year 1923.

Place and Month.	Disease.	Source or Mode of Infection.
New Bedford, December (1922)	Measles	Contact
Milton, December (1922)	Typhoid	Milk (carrier)
Weymouth, February	Scarlet Fever	Contact
Belmont, February	Influenza	Contact
Dudley, March	Typhoid	Contact (carrier)
Peabody, March	Diphtheria	Contact
Maynard, March	Diphtheria	Contact
Agawam, March	Scarlet Fever	Contact
Quincy, March	Diphtheria	Contact
Haverhill, March	Scarlet Fever	Contact
Northampton, March	Scarlet Fever	Contact
Holyoke, March	Scarlet Fever	Contact
Lawrence, March and April	Typhoid	Water
Hopedale, April	Scarlet Fever	Contact
Chicopee, April	Scarlet Fever	Contact
Sunderland, April	Scarlet Fever	Contact
Milford, April	Scarlet Fever	Contact
Arlington, May	Septic Sore Throat	Unknown
Millbury, June	Diphtheria	Contact
Newburyport, September	Typhoid	Unknown
Ware, September	Diphtheria	Contact
Taunton, October	Typhoid	Milk (carrier)
Falmouth, November	Diphtheria	Contact (carrier)
Maynard, November	Diphtheria	Contact

Anterior Poliomyelitis.

Incidence and mortality from infantile paralysis have continued to be gratifyingly low this year. Since 1920 the number of cases and deaths each year have remained nearly constant.

Year.	Cases.	Deaths.	Death Rate Per 100,000.	Mortality Per Cent of Cases.
1920	696	144	3.74	20.7
1921	233	48	1.23	20.6
1922	217	33	.84	15.2
1923	223	35	.90	15.7

Diphtheria.

Diphtheria deaths show a gratifying reduction this year. The death rate is the lowest since 1912.

Year.	Cases.	Deaths.	Death Rate Per 100,000.	Mortality Per Cent of Cases.
1920	7,513	591	15.3	7.86
1921	9,100	607	15.6	6.74
1922	8,826	606	15.4	6.87
1923	9,018	579	14.6	6.42

That there is hope for the future is suggested by the fact that in certain localities where immunizing has been done on something approaching an adequate scale, there has been a remarkable fall in diphtheria mortality. In this connection it may not be out of place to repeat the well-known facts that over 60 per cent of diphtheria deaths occur in children under 5 years of age, and 90 per cent in children under 10.

It is probably fair to say that the increase in cases reported since 1920 is partly due to the fact that more cultures are being taken and examined. Persons with positive cultures are often reported as cases even without any symptoms. Formerly they would not have been discovered or reported at all. This indicates more interest and intelligence in dealing with diphtheria.

Encephalitis Lethargica.

The prevalence and death rate from this disease have remained nearly constant since it was made reportable in 1921.

Year.	Cases.	Deaths.	Death Rate Per 100,000.	Mortality Per Cent of Cases.
1921	117	81	2.08	69
1922	163	83	2.11	51
1923	180	85	2.12	47.2

Epidemic Cerebrospinal Meningitis.

Year.	Cases.	Deaths.	Death Rate Per 100,000.	Mortality Per Cent of Cases.
1920	182	129	3.26	71.0
1921	164	49	1.26	29.9
1922	105	47	1.19	44.8
1923	121	41	1.0	33.9

Influenza.

Influenza showed a considerably increased death rate during the early months of the year, although the number of cases reported fell off.

Year.	Cases.	Deaths.	Death Rate Per 100,000.
1920	36,312	1,623	42.1
1921	735	153	3.9
1922	7,453	569	14.5
1923	2,466	742	18.7

Measles.

Year.	Cases.	Deaths.	Death Rate Per 100,000.	Mortality Per Cent of Cases.
1920	32,141	352	9.1	1.1
1921	17,827	179	4.6	1.0
1922	23,291	218	5.5	.94
1923	26,854	321	8.1	1.2

While the number of cases reported this year has not been quite so high as in 1920, the death rate has been practically the same. The median death rate for 5 years, 1918-1922, inclusive, is 9.1.

In 1922, 62.5 per cent of the deaths from this disease occurred in children under 2 years of age.

Lobar Pneumonia.

That the reporting of cases of lobar pneumonia is still faulty is evidenced by the fact that mortality, based on cases reported, averages around 50 per cent.

Year.	Cases.	Deaths.	Death Rate Per 100,000.
1920	5,558	2,842	73.8
1921	4,080	1,823	46.9
1922	5,194	2,344	59.6
1923	4,759	2,313	58.3

Scarlet Fever.

The number of cases of scarlet fever reported this year exceeds that of any previous year. The death rate, however, has not materially increased over last year, and is nearly the same as the median rate for 5 years, 1918-1922, inclusive.

Year.	Cases.	Deaths.	Death Rate Per 100,000.
1920	10,260	214	5.6
1921	8,331	191	4.9
1922	7,868	149	3.8
1923	12,300	155	3.9

This would indicate that the disease has been of a milder type this year than it was in 1920, and probably there is better diagnosis and reporting of the disease.

Syphilis.

Year.	Cases.	Deaths.	Death Rate Per 100,000.
1918	3,284	280	7.2
1919	4,127	281	7.3
1920	2,987	224	5.8
1921	2,497	200	5.15
1922	1,933	213	5.4
1923	1,891	194	4.9

The fact that the number of cases reported and the death rate are dropping together is good indication that we are making some progress in combating this infection.

Tuberculosis, Pulmonary.

Year.	Cases.	Deaths.	Death Rate Per 100,000.	Mortality Per Cent of Cases.
1920	6,696	3,750	97.3	56
1921	6,168	3,272	84.2	53
1922	5,562	3,167	80.5	57
1923	5,356	3,062	77.1	57

It seems worthy of note that the mortality (per cent of cases reported) remains nearly constant. This would indicate that the fall in the death rate is due to a lowered *incidence* of the disease, rather than to any decrease of virulence after the disease has been diagnosed and reported.

Tuberculosis, Other Forms.

Year.	Cases.	Deaths.	Death Rate Per 100,000.	Mortality Per Cent of Cases.
1920	800	650	16.8	81
1921	827	595	15.3	72
1922	817	569	14.4	69.5
1923	807	528	13.3	65

The striking feature of sharp decline in apparent mortality is most probably due to better diagnosis and reporting of cases. The fall in death rate is now nearly parallel to that from pulmonary tuberculosis.

Typhoid Fever.

Year.	Cases.	Deaths.	Death Rate Per 100,000.	Mortality Per Cent of Cases.
1920	935	95	2.5	10.2
1921	917	119	3.1	13.0
1922	693	86	2.2	12.4
1923	622	70	1.8	11.3

Aside from the lowest number of cases and deaths ever recorded for one year, the striking fact about the typhoid situation this year was that during the summer and autumn the deaths recorded failed to rise in the usual way during these months.¹ This is illustrated by the following table:

Median Deaths by Months. 5 years, 1918-1922 inclusive	Jan.	Feb.	Mar.	April	May	June	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Deaths, 1923, by months	9	6	6	5	7	8	8	14	21	23	8	8
	6	2	7	9	7	4	4	6	5	8	8	3

As regards outbreaks during the year, there were four of moderate proportions. Of the four, one (Lawrence) was presumably due to water, two were due to carriers who were discovered by investigation (Dudley and Taunton), and one was undetermined as to cause but was presumed to be due to infection of a milk supply by an unknown case or carrier (Newburyport).

Carriers.

Ten new carriers were discovered during the year, of whom six are known to have had typhoid recently. Of the other four, three were discovered as a result of investigation of outbreaks. One was discovered in the course of routine examination of food handlers. The increasing number of cultures made from convales-

¹ It was suggested that the small number of deaths in the autumn was connected with the unusual dryness of the summer. A study of the typhoid deaths and rainfall for 15 years revealed no visual or numerical correlation.

cent patients is favorable, but is still far too small. In two cases this year the patients were discovered to be carriers only after they had returned home from the hospital and had infected other people.

Whooping Cough.

Year.	Cases.	Deaths.	Death Rate Per 100,000.	Mortality Per Cent of Cases.
1920	9,994	546	14.2	5.47
1921	5,703	201	5.2	3.52
1922	6,823	294	7.5	4.3
1923	10,612	493	12.4	4.65

A new record was set this year for number of cases reported but the deaths were fewer than in 1920. The largest number of cases reported for one month was in March, 1,883 cases.

In 1922, 56.5 per cent of the deaths from this disease occurred in infants under one year of age, thus contributing materially to the infant mortality for the year.

Smallpox.

Smallpox was reported in six cases. The first two were in July. There was no connection between the two. Both were infected while travelling in the middle West. In December four cases appeared simultaneously at Adams. All were associated with an individual who spent two weeks visiting a relative in Adams during the incubation and prodromal period of the disease. He came from New York State and returned there before the diagnosis was made. All cases were mild and no deaths were recorded.

Vaccination histories were as follows:

Case 1, age 22, vaccinated 16 years ago.

Case 2, age 37, unsuccessfully vaccinated 29 years ago.

Case 3, age 28, vaccinated 8 days previous to onset.

Case 4, age 50, vaccinated 13 days previous to onset.

Case 5, age 24, vaccinated 14 days previous to onset.

Case 6, age 26, vaccinated 14 days previous to onset.

Rabies.

Rabies was reported in three cases. Two were in January and one in September. The two cases reported in January actually died the month previous. The September case was bitten in January by a dog which died a few days later of "stomach trouble." Pasteur treatment was given in one case.

Anthrax.

Anthrax was reported in seven cases. In one the diagnosis was not confirmed. Two cases appeared in leather workers who were said to handle nothing but finished leather. This would seem to convey a warning of the possibility of leather becoming contaminated by anthrax spores after tanning, unless handled so as to protect it from this danger.

Dog-bite Requiring Anti-rabic Treatment.

The number of cases reported as dog-bite requiring anti-rabic treatment has increased from 181 last year to 252 this year. This is partly due to the fact that some large communities are now in the habit of reporting all cases of dog-bite.

Immunization of dogs against rabies is being carried out successfully in Connecticut. It should be made more popular here.

Cases and Deaths, with Case and Death Rates per 100,000 Population for All Reportable Diseases during the Year 1923.

DISEASE.	Cases.	Deaths	Case Rate.	Death Rate.	Fatality Rate (Per Cent).
Actinomycosis	6	4	.2	.1	66.7
Anterior Poliomyelitis	223	35	5.6	.9	15.7
Anthrax	7	2	.2	.1	28.6
Chickenpox	7,983	11	201.1	.3	.1
Diphtheria	9,018	579	227.2	14.6	6.4
Dog Bite ¹	252	—	6.3	—	—
Dysentery	3	2	.1	.1	66.7
Encephalitis Lethargica	180	85	4.5	2.1	47.2
Epidemic Cerebrospinal Meningitis	121	41	3.0	1.0	33.9
German Measles	527	—	13.3	—	—
Gonorrhea	4,885	3	123.1	.1	.1
Hookworm	12	—	.3	—	—
Influenza	2,466	742	62.1	18.7	30.1
Leprosy	1	—	—	—	—
Malaria	23	3	.6	.1	13.0
Measles	26,854	321	676.5	8.1	1.2
Mumps	7,707	6	194.1	.2	.1
Ophthalmia Neonatorum ²	1,480	—	37.3	—	—
Pellagra	16	11	.4	.3	68.8
Pneumonia, Lobar	4,759	2,313	119.9	58.3	48.4
Rabies	3	1	.1	—	33.3
Scarlet Fever	12,300	155	309.8	3.9	1.3
Septic Sore Throat	197	27	4.9	.7	13.7
Smallpox	6	—	.2	—	—
Syphilis	1,891	194	47.6	4.9	10.3
Tetanus	28	18	.7	.5	64.3
Trachoma	62	—	1.6	—	—
Trichinosis	13	—	.3	—	—
Tuberculosis, Pulmonary	5,356	3,062	134.9	77.1	57.2
Tuberculosis, Other Forms	807	528	20.3	13.3	65.4
Typhoid Fever	622	70	15.7	1.8	11.3
Typhus Fever	1	—	—	—	—
Whooping Cough	10,612	493	267.3	12.4	4.6
	98,421	8,706	2,479.2	219.6	8.8

¹ Requiring anti-rabic treatment.² Includes suppurative conjunctivitis.

Cases and Deaths from Communicable Diseases by Months, 1923.

	JAN- UARY.		FEB- RUARY.		MARCH.		APRIL.		MAY.		JUNE.		JULY.		AUGUST.		SEP- TEMBER.		OCTOBER.		NO- VEMBER.		DE- CEMBER.		TOTAL.		
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	
Actinomycosis	10	3	1	2	2	5	1	1	1	1	1	1	1	2	4	26	4	38	3	1	6	40	6	25	2	223	6
Anterior Poliomyelitis	2	2	9	6	5	2	6	1	4	4	4	4	8	4	1	2	4	1	48	1	1	40	1	25	1	223	7
Anthrax	992	2	567	5	574	2	565	1	699	1	699	1	377	2	116	137	1	137	1	561	1	1201	1	1583	2	7983	11
Chickenpox	890	80	655	58	609	35	611	33	613	35	613	33	482	32	559	34	605	37	1060	63	1151	61	1102	55	9018	579	
Diphtheria	28	1	19	15	11	24	15	24	24	24	24	54	54	19	19	17	17	9	9	9	2	23	2	23	2	252	3
Dog-bite																											
Dysentery	8	2	27	14	53	14	23	13	15	10	8	6	8	3	12	4	8	4	9	6	6	3	3	6	3	180	85
Encephalitis Lethargica																											
Epidemic Cerebrospinal Meningitis	11	2	12	2	11	5	11	5	5	5	3	3	11	4	10	2	10	5	13	4	9	2	7	2	121	41	
German Measles	32	25	313	107	45	377	354	404	2	419	71	411	20	20	14	503	9	439	23	29	29	32	32	32	4885	3	
Gonorrhea	426																										
Hookworm	611	134	1162	202	486	202	79	70	22	28	11	12	3	3	11	7	13	5	15	12	23	14	30	24	2466	742	
Influenza																											
Leprosy																											
Malaria	3623	69	3873	54	3609	54	3863	36	4360	32	2985	18	1037	17	271	5	157	2	660	2	1096	4	1320	6	26854	321	
Measles	840		751	3	1188	1032	1032	1	1052	1	729	269	1	1	101	101	108	283	283	587	1	587	1	797	1	7707	6
Mumps																											
Ophthalmia Neonatorum	109		124	127	127	127	121	121	127	102	102	124	124	124	114	114	120	120	144	1	139	129	129	1	1480	1	
Pellagra	1																										
Pneumonia, Lobar	901	443	974	353	790	353	463	245	341	140	165	84	92	42	80	40	110	47	197	106	269	125	377	184	4759	2313	
Rabies	2																										
Scarlet Fever	1215	14	1300	23	1566	28	1419	28	1470	11	1054	11	437	9	282	3	312	2	677	8	1018	5	1550	13	12300	155	
Septic Sore Throat	14	2	9	6	2	81	6	2	81	14	14	3	6	3	9	1	4	1	17	4	15	3	10	10	197	27	
Smallpox	155	19	141	27	165	16	138	16	177	19	141	13	142	10	147	12	165	10	161	19	171	13	188	20	1891	194	
Syphilis																											
Tetanus																											
Trachoma	7		4	5	5	3	13	1	3	4	4	8	6	4	3	4	3	3	2	1	3	2	1	1	28	18	
Trichinosis																											
Tuberculosis																											
Pulmonary	406	252	432	261	425	296	472	280	568	323	490	260	463	267	395	225	442	207	489	215	383	218	391	258	5356	3062	
Other Forms	50	42	55	44	65	63	84	56	116	60	70	39	64	39	61	42	58	33	75	45	52	26	57	39	807	528	
Typhoid Fever	38	6	20	2	41	7	41	9	51	7	44	4	58	4	64	6	97	5	89	8	47	9	32	3	622	70	
Typhus Fever																											
Whooping Cough	1533	68	1404	87	1833	81	1483	61	1241	47	708	36	472	30	375	20	341	18	335	18	426	9	411	18	10612	493	

CASES AND DEATHS FROM DISEASES DANGEROUS TO THE PUBLIC HEALTH, 1923.
Index to Line Numbers in the Table of Cases and Deaths from Diseases Dangerous to the Public Health, 1923.

Abington	111	Dracut	103	Lenox	184
Acton	194	Dudley	151	Leominster	41
Acushnet	139	Dunstable	332	Leverett	301
Adams	63	Duxbury	245	Lexington	96
Agawam	120	East Bridgewater	145	Leyden	335
Alford	345	East Brookfield	282	Lincoln	277
Amesbury	68	East Longmeadow	168	Littleton	243
Amherst	117	Eastham	327	Longmeadow	150
Andover	80	Easthampton	65	Lowell	10
Arlington	40	Easton	121	Ludlow	81
Ashburnham	199	Edgartown	259	Lunenburg	213
Ashby	291	Egremont	334	Lynn	12
Ashfield	289	Enfield	288	Lynnfield	253
Ashland	175	Erving	232	Malden	21
Athol	77	Essex	240	Manchester	196
Attleboro	42	Everett	28	Mansfield	99
Auburn	128	Fairhaven	85	Marblehead	95
Avon	191	Fall River	9	Marion	258
Ayer	149	Falmouth	152	Marlboro	55
Barnstable	124	Fitchburg	27	Marshfield	254
Barre	148	Florida	355	Mashpee	347
Becket	308	Foxboro	126	Mattapoisett	252
Bedford	237	Framingham	46	Maynard	94
Belchertown	198	Franklin	100	Medfield	141
Bellingham	189	Freetown	224	Medford	24
Belmont	64	Gardner	49	Medway	154
Berkley	281	Gay Head	361	Melrose	44
Berlin	284	Georgetown	200	Mendon	275
Bernardston	293	Gill	285	Merrimac	187
Beverly	37	Gloucester	39	Methuen	51
Billerica	133	Goshen	358	Middleboro	82
Blackstone	140	Gosnold	363	Middlefield	344
Blandford	324	Grafton	92	Middleton	261
Bolton	300	Granby	295	Millford	59
Boston	3	Granville	306	Millbury	109
Bourne	179	Great Barrington	106	Millis	218
Boxboro	340	Greenfield	47	Millville	181
Boxford	313	Greenwich	323	Milton	76
Boylston	286	Groton	197	Monroe	364
Braintree	66	Groveland	163	Monson	125
Brewster	302	Hadley	161	Montague	90
Bridgewater	86	Halifax	310	Monterey	348
Brimfield	299	Hamilton	219	Montgomery	346
Brookton	16	Hampden	304	Mount Washington	365
Brookfield	226	Hancock	318	Nahant	249
Brookline	29	Hanover	173	Nantucket	171
Buckland	236	Hanson	202	Natick	72
Burlington	274	Hardwick	166	Needham	91
Cambridge	11	Harvard	157	New Ashford	360
Canton	104	Harwich	216	New Bedford	8
Carlisle	316	Hatfield	167	New Braintree	331
Carver	321	Haverhill	18	New Marlboro	273
Charlemont	296	Hawley	329	New Salem	319
Charlton	205	Heath	339	Newbury	264
Chatham	207	Hingham	113	Newburyport	53
Chelmsford	108	Hinsdale	278	Newton	22
Chelsea	26	Holbrook	146	Norfolk	268
Cheshire	225	Holden	147	North Adams	36
Chester	248	Holland	359	North Andover	101
Chesterfield	330	Holliston	169	North Attleboro	78
Chicopee	30	Holyoke	17	North Brookfield	183
Chilmark	354	Hopedale	162	North Reading	246
Clarksburg	257	Hopkinton	195	Northampton	38
Clinton	62	Hubbardston	272	Northboro	209
Cohasset	172	Hudson	83	Northbridge	70
Colrain	220	Hull	231	Northfield	208
Concord	102	Huntington	228	Norton	188
Conway	290	Ipswich	105	Norwell	255
Cumington	328	Kingston	177	Norwood	57
Dalton	137	Lakeville	235	Oak Bluffs	279
Dana	309	Lancaster	182	Oakham	317
Danvers	69	Lanesboro	271	Orange	119
Dartmouth	93	Lawrence	15	Orleans	280
Dedham	73	Lee	135	Otis	337
Deerfield	164	Leicester	136	Oxford	130
Dennis	233			Palmer	74
Dighton	170			Paxton	312
Douglas	192			Peabody	43
Dover	292				

Pelham	311	Shirley	185	Warren	160
Pembroke	234	Shrewsbury	127	Warwick	350
Pepperell	190	Shutesbury	353	Washington	351
Peru	362	Somerset	138	Watertown	34
Petersham	305	Somerville	14	Wayland	203
Phillipston	333	South Hadley	114	Webster	58
Pittsfield	25	Southampton	297	Wellesley	107
Plainfield	338	Southboro	206	Wellfleet	294
Plainville	239	Southbridge	56	Wendell	336
Plymouth	61	Southwick	269	Wenham	262
Plympton	325	Spencer	112	West Boylston	204
Prescott	356	Springfield	7	West Bridgewater	155
Princeton	303	Sterling	251	West Brookfield	247
Provincetown	129	Stockbridge	212	West Newbury	221
Quincy	19	Stoneham	84	West Springfield	54
Randolph	123	Stoughton	98	West Stockbridge	283
Raynham	215	Stow	266	West Tisbury	341
Reading	88	Sturbridge	217	Westboro	116
Rehoboth	201	Sudbury	270	Westfield	45
Revere	32	Sunderland	242	Westford	144
Richmond	307	Sutton	180	Westhampton	352
Rochester	276	Swampscott	79	Westminster	256
Rockland	89	Swansea	193	Weston	186
Rockport	142	Taunton	31	Westport	156
Rowe	342	Templeton	132	Westwood	244
Rowley	267	Tewksbury	131	Weymouth	52
Royalston	287	Tisbury	250	Whately	241
Russell	238	Tolland	357	Whitman	97
Rutland	214	Topsfield	298	Wilbraham	159
Salem	23	Townsend	230	Williamsburg	211
Salisbury	210	Truro	315	Williamstown	143
Sandisfield	322	Tyngsboro	263	Wilmington	165
Sandwich	227	Tyringham	349	Winchendon	110
Saugus	67	Upton	223	Winchester	71
Savoy	326	Uxbridge	115	Windsor	320
Scituate	178	Wakefield	60	Winthrop	48
Seekonk	158	Wales	314	Woburn	50
Sharon	176	Walpole	118	Worcester	5
Sheffield	260	Waltham	33	Worthington	343
Shelburne	229	Ware	87	Wrentham	153
Sherborn	222	Wareham	134	Yarmouth	265
				Tewksbury State Infirmary	366

Cases and Deaths from Diseases Dangerous

Line No.	CITIES AND TOWNS GROUPED IN ORDER OF POPULATION.	Popu- lation esti- mated as of July 1, 1923.	22 An- terior Polio- mye- litis.		25A Chick- en Pox.		10 Diph- theria.		24 Ep. Cere- bro- spinal Menin- gitis.		25B Ger- man Meas- les.		40 Gonor- rhea.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
1	Massachusetts	3,969,547	223	35	7983	11	9018	579	121	41	527	0	4885	3
2	CITIES OVER 500,000.													
3	Boston	749,992	40	9	2010	7	3012	178	33	13	56	0	2310	0
4	CITIES OVER 150,000.													
5	Worcester	192,322	11	1	349	0	557	33	3	4	12	0	293	0
6	CITIES 100,000-150,000.	724,586	59	10	1457	0	1075	86	31	10	52	0	754	0
7	Springfield	149,246	8	0	442	0	177	20	3	1	12	0	193	0
8	New Bedford	129,799	2	1	119	0	129	9	4	2	5	0	54	0
9	Fall River	117,314	6	2	127	0	247	21	9	3	3	0	103	0
10	Lowell	116,280	36	5	72	0	122	16	5	0	5	0	138	0
11	Cambridge	110,335	3	0	580	0	256	11	2	0	25	0	162	0
12	Lynn	101,612	3	2	117	0	144	9	8	4	2	0	104	0
13	CITIES 50,000-100,000.	434,170	23	3	601	1	1166	63	11	6	73	0	343	0
14	Somerville	97,687	3	1	95	0	215	15	4	3	16	0	58	0
15	Lawrence	97,224	8	1	190	1	231	23	2	1	25	0	104	0
16	Brockton	69,176	1	0	104	0	181	2	0	0	16	0	17	0
17	Holyoke	59,751	3	0	55	0	265	14	4	1	3	0	34	0
18	Haverhill	57,150	6	1	103	0	130	5	1	1	8	0	116	0
19	Quincy	53,182	2	0	54	0	144	4	0	0	5	0	14	0
20	CITIES AND TOWNS, 25,000-50,000	567,045	29	5	1084	1	1272	99	5	3	108	0	601	1
21	Malden	49,247	1	1	71	1	102	13	0	2	0	0	34	0
22	Newton	48,221	9	2	192	0	48	6	0	0	20	0	17	0
23	Salem	46,456	1	1	38	0	132	22	0	0	5	0	37	0
24	Medford	45,321	2	0	113	0	109	2	1	0	3	0	25	0
25	Pittsfield	43,352	1	0	46	0	125	14	0	0	10	0	20	0
26	Chelsea	43,006	1	0	67	0	62	2	1	0	2	0	225	0
27	Fitchburg	42,041	0	0	31	0	101	10	0	1	1	0	20	0
28	Everett	41,891	5	0	122	0	127	3	2	0	0	0	28	0
29	Brookline	40,884	1	0	218	0	47	1	0	0	25	0	12	0
30	Chicopee	40,691	0	0	6	0	61	6	0	0	2	0	5	0
31	Taunton	37,855	0	0	13	0	14	1	1	0	1	0	96	1
32	Revere	31,508	4	0	0	0	121	5	0	0	0	0	49	0
33	Waltham	31,475	2	1	144	0	151	12	0	0	39	0	16	0
34	Watertown	25,097	2	0	23	0	72	2	0	0	0	0	17	0
35	CITIES AND TOWNS, 10,000-25,000.	605,338	30	1	922	2	897	51	17	4	104	0	278	2
36	North Adams	22,464	2	0	5	0	20	1	1	0	0	0	1	0
37	Beverly	22,267	0	0	39	1	21	0	1	0	0	0	7	0
38	Northampton	22,168	4	0	47	0	4	1	0	0	2	0	25	0
39	Gloucester	21,820	0	0	6	0	52	6	0	1	2	0	7	0
40	Arlington	21,447	0	0	21	0	52	2	0	0	4	0	9	0
41	Leominster	21,291	2	0	0	0	17	2	1	0	1	0	10	0
42	Attleboro	20,652	0	0	50	0	13	0	0	0	1	0	34	0
43	Peabody	20,235	0	0	30	0	108	6	0	0	1	0	20	0
44	Melrose	19,180	0	0	22	0	16	1	0	0	4	0	7	0
45	Westfield	18,747	3	0	23	0	33	6	0	0	0	0	8	0
46	Frammingham	17,897	0	0	29	0	5	0	2	2	6	0	3	0
47	Greenfield	17,558	0	0	50	0	12	0	1	0	1	0	11	0
48	Winthrop	17,443	0	0	51	0	14	0	0	0	2	0	6	0
49	Gardner	17,409	0	0	28	0	18	3	1	0	0	0	17	1
50	Woburn	16,693	0	0	15	0	37	0	1	0	2	0	7	0
51	Methuen	16,060	1	0	41	0	43	3	0	0	28	0	4	0
52	Weymouth	15,859	0	0	14	0	37	1	0	0	0	0	4	0
53	Newburyport	15,845	0	0	25	0	6	2	1	1	0	0	5	0
54	West Springfield	14,993	3	1	13	0	26	2	1	0	0	0	6	0
55	Marlboro	14,864	1	0	33	0	11	0	1	0	0	0	4	0
56	Southbridge	14,266	0	0	16	0	30	2	1	0	1	0	3	0
57	Norwood	13,842	0	0	29	0	29	0	0	0	16	0	6	0
58	Webster	13,769	1	0	13	0	6	4	0	0	0	0	5	0
59	Milford	13,314	0	0	3	0	4	0	0	0	1	0	1	1
60	Wakefield	13,204	2	0	25	0	23	0	0	0	3	0	5	0
61	Plymouth	13,133	0	0	50	0	10	0	0	0	2	0	2	0
62	Clinton	12,822	1	0	35	0	10	0	0	0	1	0	6	0
63	Adams	12,782	2	0	5	0	4	0	0	0	0	0	5	0
64	Belmont	12,716	0	0	37	0	13	0	0	0	12	0	9	0
65	Easthampton	12,304	0	0	6	0	15	0	2	0	0	0	0	0
66	Braintree	11,490	1	0	31	0	27	1	1	0	6	0	8	0
67	Saugus	11,350	2	0	10	0	38	0	2	0	0	0	3	0
68	Amesbury	11,135	2	0	4	0	35	2	0	0	0	0	16	0
69	Danvers	11,059	0	0	3	0	26	2	0	0	0	0	1	0
70	Northbridge	10,853	0	0	18	0	15	0	0	0	0	0	0	0
71	Winchester	10,839	2	0	56	0	10	0	0	0	2	0	3	0
72	Natick	10,750	0	0	13	0	29	0	0	0	0	0	4	0
73	Dedham	10,507	0	0	24	1	18	2	0	0	6	0	4	0
74	Palmer	10,211	1	0	2	0	10	2	0	0	0	0	2	0
75	Towns 5,000-10,000.	319,445	16	0	913	0	651	32	8	0	65	0	191	1
76	Milton	9,959	0	0	17	0	12	0	1	0	7	0	1	0
77	Athol	9,799	0	0	6	0	14	1	0	0	0	0	3	0

to the Public Health, 1923.

11		101		7		13		40A		8		38		31. 37 37A, 37B		32-36E		1		9		Line No.
Influenza.		Lobar Pneumonia.		Measles.		Mumps.		Ophthalmia Neonatorum.		Scarlet Fever.		Syphilis.		Tuberculosis, Pulmonary.		Tuberculosis, Other Forms.		Typhoid Fever.		Whooping Cough.		
Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	
2466	742	4759	2313	26854	321	7707	6	1480	0	12300	155	1891	194	5356	3062	807	528	622	70	10612	493	1
377	69	1313	633	5133	60	1627	0	514	0	2828	60	837	49	1576	637	256	150	106	11	2043	111	2
49	18	297	125	937	13	260	1	166	0	705	6	104	15	246	136	22	16	20	5	214	13	3
322	106	911	352	6109	131	821	0	429	0	1612	17	285	25	1038	533	244	109	91	18	2094	89	4
84	27	216	72	113	0	207	0	54	0	333	3	86	7	163	63	24	13	16	2	265	7	5
21	26	98	33	1826	58	12	0	161	0	72	2	57	7	214	96	118	29	5	1	194	18	6
39	21	98	42	567	27	17	0	129	0	223	3	37	4	209	121	23	21	29	4	153	14	7
55	8	141	63	1328	26	120	0	22	0	229	5	36	2	158	82	32	24	10	4	198	18	8
85	6	204	74	1166	8	423	0	43	0	496	3	40	3	159	112	21	11	15	4	1059	16	9
38	18	154	68	1109	12	42	0	20	0	259	1	29	2	135	59	26	11	16	3	225	16	10
134	63	526	230	2552	20	361	1	152	0	1467	15	173	10	436	230	69	48	80	8	1359	51	11
21	13	163	58	378	3	132	0	15	0	312	4	21	0	96	46	16	10	10	1	238	16	12
7	13	77	37	499	10	10	0	14	0	39	1	66	4	83	57	18	12	38	4	264	17	13
5	8	64	38	569	5	12	0	107	0	144	0	18	1	59	16	19	10	7	0	357	5	14
10	8	34	38	46	1	9	0	4	0	383	4	28	3	58	59	7	8	4	1	54	3	15
78	7	117	35	913	1	39	0	10	0	268	5	33	1	59	33	2	3	7	2	230	8	16
13	14	71	24	147	0	159	1	2	0	321	1	7	1	81	28	7	5	14	0	216	2	17
700	102	601	279	3079	32	1787	1	95	0	2143	23	208	20	658	288	86	63	104	5	1894	76	18
29	9	67	29	373	2	77	0	12	0	233	4	4	1	52	29	5	7	8	0	153	9	19
14	8	74	37	169	1	609	0	15	0	218	2	6	1	45	7	4	2	8	0	735	4	20
8	7	55	19	128	0	56	0	3	0	190	2	11	1	43	24	8	6	3	0	49	7	21
9	6	26	14	269	1	124	0	6	0	157	0	0	1	44	17	5	4	7	0	86	4	22
31	11	23	19	306	0	27	0	0	0	180	3	13	0	79	25	10	9	2	0	23	3	23
13	10	80	22	180	3	56	0	26	0	180	1	98	2	76	28	11	3	22	2	41	11	24
0	0	26	20	180	1	2	0	3	0	135	4	5	1	44	25	8	7	9	2	4	2	25
116	3	58	11	377	3	180	0	9	0	114	1	6	1	45	14	10	3	8	0	166	6	26
22	6	30	14	270	0	217	0	4	0	140	0	20	4	27	9	6	5	7	0	401	4	27
6	10	22	15	5	0	0	0	3	0	61	1	3	0	46	32	3	2	1	0	10	3	28
20	6	68	37	559	17	7	0	5	0	194	2	30	4	71	53	3	9	16	1	80	11	29
0	2	6	13	3	4	0	1	0	0	82	1	9	0	25	5	2	0	1	0	0	9	30
426	23	46	19	85	0	414	0	7	0	137	2	1	4	41	15	7	5	9	0	120	3	31
6	1	20	10	175	0	18	0	2	0	122	0	2	0	20	5	4	1	3	0	26	0	32
490	157	609	316	3594	22	1061	1	41	0	1919	13	87	32	71	394	79	67	119	16	1251	77	33
3	8	18	6	13	0	5	0	3	0	36	0	8	0	14	10	0	2	14	5	3	0	34
4	3	21	5	38	0	2	0	0	0	40	0	7	1	27	10	2	2	9	2	61	8	35
2	11	28	13	17	0	38	0	0	0	149	0	8	20	30	56	1	2	2	0	45	5	36
0	15	8	7	2	0	1	0	0	0	60	1	2	1	28	14	3	0	0	0	1	4	37
8	1	26	12	298	2	41	0	1	0	78	0	1	0	27	8	2	2	2	0	66	3	38
77	9	14	12	118	1	30	0	2	0	69	1	1	2	36	10	2	2	2	0	0	1	39
0	3	8	5	16	0	23	0	2	0	99	0	5	2	32	10	6	1	1	0	30	6	40
0	3	23	10	157	0	4	0	1	0	91	1	0	1	20	3	4	0	3	0	65	1	41
9	0	16	10	3	1	16	0	2	0	40	0	1	0	45	34	0	2	0	0	15	4	42
7	6	10	10	58	0	370	0	3	0	73	1	2	0	12	4	2	0	2	1	40	0	43
3	3	5	4	15	0	11	0	3	0	22	1	2	0	9	3	2	2	3	0	79	3	44
25	4	29	9	375	0	73	0	0	0	35	0	3	0	10	3	2	1	1	0	68	0	45
1	7	14	8	36	0	4	0	1	0	29	0	13	1	35	9	3	3	5	0	16	1	46
11	3	24	12	175	5	3	1	2	0	31	0	2	0	18	7	2	0	1	0	28	1	47
1	2	16	6	154	2	0	0	1	0	16	1	2	0	24	6	3	3	3	0	147	2	48
3	6	11	7	25	0	1	0	0	0	143	0	2	1	11	14	1	0	2	0	19	1	49
25	6	18	17	167	0	4	0	2	0	12	0	3	0	12	8	2	2	20	4	23	4	50
3	5	24	10	21	0	23	0	0	0	40	0	1	0	18	2	1	0	1	0	21	3	51
5	4	11	7	305	1	13	0	1	0	50	0	3	0	8	7	2	2	2	0	30	0	52
0	0	9	4	111	1	17	0	1	0	14	0	0	2	7	4	0	1	10	1	15	0	53
1	1	2	23	6	3	0	30	0	1	23	0	0	0	8	1	2	3	0	0	19	0	54
4	4	11	2	3	1	1	0	7	0	91	0	0	0	16	7	2	5	0	0	18	4	55
0	2	18	12	28	1	0	0	0	0	116	1	0	0	5	8	3	4	1	0	0	0	56
4	3	18	4	225	0	0	0	1	0	75	1	0	0	28	7	2	3	6	0	6	2	57
26	6	20	12	17	0	19	0	0	0	11	0	0	0	16	2	0	1	1	0	47	6	58
1	2	17	7	5	0	77	0	0	0	27	1	0	0	11	6	4	4	1	0	28	1	59
11	4	7	7	24	2	8	0	1	0	9	1	0	0	22	2	2	0	5	1	8	0	60
8	0	24	10	316	1	46	0	0	0	34	0	1	0	14	4	1	1	1	0	121	1	61
4	1	18	7	21	0	3	0	1	0	21	1	0	0	18	7	4	0	0	0	4	7	62
120	4	15	2	304	0	112	0	2	0	56	0	2	0	9	38	2	2	0	0	78	2	63
84	3	11	7	123	0	23	0	0	0	49	0	2	0	8	4	0	2	1	0	60	0	64
9	6	10	7	99	1	7	0	0	0	11	0	3	1	7	6	0	0	5	1	4	1	65
9	1	14	14	39	0	3	0	0	0	29	1	0	1	30	27	1	3	1	0	8	0	66
12	1	28	8	101	0	37	0	0	0	16	0	1	0	12	6	1	2	3	1	12	3	67
0	6	6	7	7	1	7	0	2	0	106	1	0	0	11	8	1	1	1	0	20	0	68
0	3	7	9	63	1	1	0	0	0	58	0	1	0	5	3	0	1	4	0	11	0	69
2	1	3	6	6	0	0	0	0	0	6	0	0	0	9	3	0	1	2				

Cases and Deaths from Diseases Dangerous

Line No.	CITIES AND TOWNS GROUPED IN ORDER OF POPULATION.	Popu- lation esti- mated as of July 1, 1923.	22 An- terior Poli- mye- litis.		25A Chick- en Pox.		10 Diph- theria.		24 Ep. Cere- bro- spinal Menin- gitis.		25B Ger- man Meas- les.		40 Gonor- rhea.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
78	North Attleboro	9,119	0	0	18	0	13	0	0	0	0	0	2	0
79	Swampscott	8,658	1	0	34	0	7	0	0	0	1	0	2	0
80	Andover	8,482	1	0	16	0	5	0	0	0	4	0	7	0
81	Ludlow	8,369	1	0	2	0	24	4	1	0	0	0	2	1
82	Middleboro	8,323	0	0	185	0	25	0	0	0	0	0	4	0
83	Hudson	8,233	1	0	3	0	21	2	0	0	0	0	2	0
84	Stoneham	8,156	0	0	37	0	26	0	0	0	0	0	6	0
85	Fairhaven	8,037	1	0	42	0	11	1	1	0	0	0	0	0
86	Bridgewater	7,943	0	0	7	0	17	0	0	0	1	0	7	0
87	Ware	7,920	0	0	1	0	66	4	0	0	0	0	3	0
88	Reading	7,905	1	0	2	0	26	0	0	0	0	0	5	0
89	Rockland	7,890	1	0	11	0	12	1	0	0	1	0	4	0
90	Montague	7,490	0	0	0	0	21	0	0	0	0	0	6	0
91	Needham	7,358	0	0	22	0	4	0	0	0	1	0	1	0
92	Crafton	7,356	0	0	0	0	5	0	0	0	0	0	2	0
93	Dartmouth	7,350	0	0	28	0	15	1	1	0	0	0	0	0
94	Maynard	7,317	0	0	0	0	48	4	0	0	0	0	0	0
95	Marblehead	7,117	0	0	8	0	7	0	1	0	0	0	3	0
96	Lexington	6,948	0	0	22	0	7	0	0	0	0	0	4	0
97	Whitman	6,874	1	0	10	0	8	1	0	0	0	0	10	0
98	Stoughton	6,778	0	0	13	0	16	0	0	0	0	0	1	0
99	Mansfield	6,612	1	0	15	0	10	0	0	0	0	0	9	0
100	Franklin	6,539	0	0	10	0	4	0	0	0	2	0	6	0
101	North Andover	6,492	0	0	13	0	6	0	0	0	29	0	0	0
102	Concord	6,300	1	0	31	0	8	1	2	0	4	0	39	0
103	Dracut	6,207	1	0	33	0	0	1	0	0	0	0	0	0
104	Canton	6,183	0	0	29	0	21	0	0	0	1	0	4	0
105	Ipswich	6,149	0	0	1	0	19	1	0	0	0	0	5	0
106	Great Barrington	6,084	0	0	7	0	4	0	0	0	0	0	7	0
107	Wellesley	6,066	1	0	139	0	24	1	0	0	10	0	5	0
108	Chelmsford	6,050	0	0	54	0	2	0	0	0	1	0	1	0
109	Millbury	5,916	0	0	8	0	24	1	0	0	0	0	0	0
110	Winchendon	5,901	3	0	0	0	8	0	0	0	0	0	3	0
111	Abington	5,892	0	0	0	0	0	0	0	0	0	0	4	0
112	Spencer	5,884	0	0	3	0	3	0	0	0	0	0	4	0
113	Hingham	5,853	0	0	14	0	10	1	0	0	0	0	1	0
114	South Hadley	5,783	0	0	4	0	8	0	0	0	1	0	2	0
115	Uxbridge	5,724	0	0	1	0	33	4	0	0	0	0	8	0
116	Westboro	5,688	0	0	1	0	19	2	0	0	2	0	4	0
117	Amherst	5,544	0	0	29	0	6	0	0	0	0	0	1	0
118	Walpole	5,414	1	0	24	0	5	0	0	0	0	0	13	0
119	Orange	5,403	0	0	0	0	20	0	1	0	0	0	2	0
120	Agawam	5,366	0	0	0	0	2	1	0	0	0	0	1	0
121	Easton	5,024	0	0	13	0	5	0	0	0	0	0	1	0
122	Towns, 2,500-5,000.	172,560	2	3	261	0	203	11	5	0	24	0	46	0
123	Randolph	4,773	0	1	0	0	3	0	0	0	0	0	0	0
124	Barnstable	4,720	1	0	37	0	6	0	0	0	1	0	7	0
125	Monson	4,696	0	0	5	0	2	1	0	0	0	0	0	0
126	Foxboro	4,416	0	0	4	0	0	0	0	0	0	0	0	0
127	Shrewsbury	4,380	0	0	1	0	1	0	0	0	0	0	0	0
128	Auburn	4,339	0	0	1	0	0	0	0	0	0	0	1	0
129	Provincetown	4,211	0	0	1	0	3	0	0	0	0	0	4	0
130	Oxford	4,072	0	0	16	0	31	0	0	0	0	0	1	0
131	Tewksbury	4,022	0	0	5	0	4	0	0	0	0	0	0	0
132	Templeton	3,974	1	0	12	0	0	0	1	0	0	0	3	0
133	Billerica	3,940	0	0	12	0	2	0	0	0	0	0	1	0
134	Wareham	3,855	0	0	16	0	2	0	0	0	0	0	0	0
135	Lee	3,794	0	0	1	0	1	0	0	0	0	0	3	0
136	Leicester	3,734	0	0	0	0	1	0	0	0	0	0	0	0
137	Dalton	3,675	0	0	0	0	1	0	0	0	0	0	0	0
138	Somerset	3,625	0	0	0	0	1	0	0	0	0	0	0	0
139	Acushnet	3,582	0	0	1	0	7	0	0	0	0	0	0	0
140	Blackstone	3,567	0	0	0	0	1	0	0	0	0	0	0	0
141	Medfield	3,557	0	0	9	0	1	0	0	0	0	0	1	0
142	Rockport	3,528	0	0	0	0	1	1	0	0	0	0	0	0
143	Williamstown	3,504	0	0	0	0	1	0	0	0	0	0	0	0
144	Westford	3,411	0	0	9	0	2	0	0	0	0	0	0	0
145	East Bridgewater	3,336	0	0	0	0	5	1	0	0	0	0	1	0
146	Holbrook	3,318	0	0	0	0	1	0	0	0	0	0	2	0
147	Holden	3,306	0	0	1	0	4	0	1	0	3	0	7	0
148	Barre	3,270	0	1	0	0	3	0	0	0	0	0	0	0
149	Ayer	3,252	0	0	5	0	1	0	0	0	0	0	5	0
150	Longmeadow	3,234	0	0	9	0	0	0	0	0	0	0	0	0
151	Dudley	3,207	0	0	5	0	6	0	0	0	0	0	1	0
152	Falmouth	3,192	0	0	19	0	39	2	0	0	2	0	0	0
153	Wrentham	3,098	0	0	4	0	21	1	0	0	6	0	1	0
154	Medway	3,037	0	0	0	0	0	0	0	0	1	0	1	0

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11		101		7		13		40A		8		38		31. 37 37A, 37B		32-36E		1		9		Line No.
Influenza.		Lobar Pneumonia.		Measles.		Mumps		Ophthalmia Neonatorum. ¹		Scarlet Fever.		Syphilis.		Tuberculosis, Pulmonary.		Tuberculosis, Other Forms.		Typhoid Fever.		Whooping Cough.		
Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	
0	2	0	4	5	1	2	1	1	0	2	0	0	0	9	3	0	1	1	0	7	2	78
0	0	0	5	78	1	49	0	2	0	14	1	0	0	5	2	0	2	0	0	55	0	79
40	3	15	4	13	1	5	0	1	0	15	0	1	0	6	3	0	0	0	0	40	0	80
0	4	3	2	3	0	0	0	0	0	18	0	1	0	8	5	2	3	0	0	17	2	81
0	0	1	8	4	258	131	0	2	0	60	0	1	0	4	6	0	1	3	0	60	0	82
0	0	4	3	2	5	0	1	0	0	32	0	0	0	7	3	0	0	0	0	9	3	83
0	2	5	6	33	0	30	0	0	0	20	0	1	0	5	4	1	0	1	0	9	1	84
1	1	9	6	182	2	0	0	3	0	4	0	1	0	12	10	2	1	4	0	25	2	85
0	0	1	4	84	2	5	0	0	0	21	0	92	7	16	10	0	2	0	0	27	1	86
0	0	2	6	31	1	0	0	0	0	0	0	0	0	7	7	1	1	0	0	13	1	87
0	0	1	2	4	2	0	1	0	0	11	0	2	0	6	11	0	0	0	0	0	1	88
4	4	6	3	113	0	5	0	1	0	23	0	0	0	3	2	0	0	0	0	8	1	89
0	0	5	5	5	0	0	0	1	0	5	0	3	0	1	2	0	3	2	0	1	0	90
0	0	3	5	4	97	1	38	0	0	8	0	2	0	3	2	1	1	1	0	13	0	91
0	0	0	3	0	0	0	0	0	0	0	0	1	2	4	10	0	0	0	0	0	0	92
0	0	6	7	0	161	0	2	0	41	0	21	1	0	0	4	0	0	1	0	50	1	93
0	0	2	0	5	0	0	0	0	0	4	0	0	0	10	3	1	1	0	2	0	0	94
0	0	1	8	4	0	2	0	0	0	15	0	0	0	0	5	0	0	1	0	1	0	95
21	2	9	2	165	0	6	0	0	0	16	0	1	0	8	5	2	2	1	0	18	0	96
4	1	18	5	2	0	2	0	0	0	14	0	2	0	1	4	0	1	0	0	32	0	97
1	1	9	5	75	1	4	0	0	0	19	0	0	0	7	6	0	0	0	0	2	1	98
0	0	5	23	4	31	0	43	0	2	19	1	1	1	10	3	1	1	1	0	15	0	99
3	5	16	5	21	0	1	0	1	0	10	0	1	0	3	3	0	0	1	0	0	0	100
62	1	9	2	32	0	1	0	0	0	3	0	0	0	4	4	1	1	0	0	41	0	101
0	0	1	0	3	160	2	18	0	0	8	1	0	0	4	1	1	2	0	0	22	0	102
0	0	8	2	179	0	55	0	0	0	7	0	1	0	10	3	5	3	0	0	34	1	103
0	0	1	1	4	0	1	0	0	0	2	0	0	0	9	2	0	0	0	0	14	0	104
0	0	8	2	41	0	27	0	0	0	26	0	0	0	2	2	0	0	1	0	0	2	105
1	1	4	3	128	0	65	0	0	0	59	0	0	0	3	0	1	0	1	0	90	0	106
0	0	1	4	75	0	24	0	0	0	12	0	1	0	8	4	0	0	1	0	6	0	107
1	1	6	5	101	0	1	0	0	0	8	0	1	0	7	4	0	0	1	0	11	2	108
0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	3	0	0	0	0	1	0	109
0	0	1	4	2	100	0	0	0	0	25	0	0	0	4	1	1	0	2	0	7	1	110
0	0	6	7	32	0	62	0	0	0	5	0	0	0	4	4	0	0	4	0	9	0	111
29	0	2	6	2	5	0	0	0	0	28	1	0	1	2	2	0	1	0	0	3	1	112
1	0	2	3	12	0	2	0	0	0	7	0	1	0	1	0	0	0	0	0	3	1	113
0	0	1	8	12	0	2	0	0	0	4	0	27	2	5	6	0	0	0	0	0	0	115
5	3	8	6	4	0	5	0	2	0	87	0	0	0	3	0	1	0	1	0	21	2	116
1	0	14	0	4	0	65	0	1	0	1	0	1	0	1	2	0	0	0	0	2	0	118
0	2	0	3	1	0	0	0	0	0	15	1	0	0	10	0	0	0	0	0	0	0	119
0	0	1	0	0	0	0	0	0	0	26	0	0	0	9	0	0	0	0	0	0	0	120
0	0	1	1	45	0	3	0	1	0	4	0	0	0	2	5	3	2	2	0	26	1	121
115	64	94	73	1479	27	416	0	11	0	382	6	16	6	166	116	7	23	34	4	336	25	122
0	0	2	3	6	0	1	0	0	0	27	0	0	0	1	1	0	2	1	1	0	0	123
6	7	3	2	191	0	113	0	4	0	4	0	3	0	1	1	0	0	1	0	36	1	124
0	0	1	6	5	0	0	0	0	0	0	0	0	1	1	4	0	1	1	0	0	0	125
0	5	3	3	8	0	1	0	0	0	12	0	3	0	10	5	0	1	0	0	35	0	126
0	0	0	1	23	0	0	0	0	0	12	1	0	0	3	1	0	0	0	0	2	0	127
0	0	0	0	41	0	0	0	0	0	4	0	0	0	0	2	0	0	0	0	16	0	128
1	2	0	0	25	0	65	0	1	0	14	0	2	0	3	1	0	0	0	0	17	0	129
0	0	4	1	6	0	1	0	0	0	8	0	0	0	2	1	0	0	1	0	8	2	130
0	0	1	2	2	0	5	0	0	0	6	0	0	0	0	1	0	0	1	0	5	0	131
60	2	2	1	110	0	0	0	2	0	10	0	0	0	6	1	0	1	0	0	0	0	132
0	0	3	1	16	1	4	0	0	0	23	0	1	0	10	7	0	0	1	1	9	0	133
0	0	3	7	107	3	0	0	0	0	10	0	0	0	5	1	0	1	1	0	3	5	134
0	0	0	1	0	0	0	0	0	0	9	0	0	0	5	2	0	2	1	0	0	0	135
0	0	1	1	8	1	1	0	1	0	2	0	0	0	0	3	0	0	1	0	8	0	136
0	4	0	1	1	0	0	0	0	0	17	0	0	0	2	4	0	0	0	0	0	0	137
10	2	6	1	28	2	0	0	0	0	1	0	0	0	19	8	1	0	1	0	0	0	138
0	0	1	1	80	3	0	0	0	0	8	0	0	6	4	1	1	0	0	0	2	139	
0	2	10	5	0	0	0	0	0	0	2	0	3	2	2	2	0	0	1	0	0	0	140
0	0	4	7	2	0	0	0	0	0	1	0	1	1	5	14	0	2	0	0	3	0	141
0	1	0	0	7	0	2	0	0	0	9	1	0	0	6	2	1	1	3	0	0	0	142
0	2	0	3	12	0	0	0	0	0	2	0	0	1	0	3	0	1	1	0	1	0	143
1	0	1	1	2	0	0	0	0	0	9	0	1	0	0	4	0	0	2	0	4	4	145
0	0	1	0	34	0	1	0	0	0	8	0	1	0	5	1	0	0	0	0	4	0	146
0	0	0	2	16	0	0	0	0	0	0	0	0	0	3	1	0	1	3	1	11	0	147
1	0	5	2	4	0	0	0	0	0	3	0	0	0	1	0	0	0	0	0	0	0	148
0	0	6	0	1	0	61	0	0	0	1	0	1	0	3	2	0	0	0	0	5	0	149
0	0	2	5	2	4	0	0	0	0	2	0	0	0	2	0	0	1	0	0	8	0	150
0	2	5	1	6	0	0	0	0	0	20	0	0	0	6	2	1	0	11	1	1	1	151
0	4	0	1	170	2	3	0	1	0	1	0	0	0	10	2	1	2	0	0	23	1	152
5	1	3	1	138	11	106	0	0	0	4	0	0	0	1	2	1	1	0	0	0	0	153
0	0	0	2	5	0	0	0	0	0	12	0	0	0	2	1	0	2	0	0	0	0	154

to the Public Health, 1923 — Continued.

11		101		7		13		40A		8		38		31. 37 37A, 37B		32-36E		1		9		Line No.
Influenza.		Lobar Pneumonia.		Measles.		Mumps		Ophthalmia Neonatorum. ¹		Scarlet Fever.		Syphilis.		Tuberculosis, Pulmonary.		Tuberculosis, Other Forms.		Typhoid Fever.		Whooping Cough.		
Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	
0	0	0	3	3	0	0	0	0	0	4	0	0	0	2	0	0	0	0	0	0	1	155
0	0	0	0	67	2	0	0	0	0	0	0	0	0	6	3	0	0	0	0	2	0	156
0	1	0	0	0	0	0	1	0	0	0	0	0	0	2	1	0	0	0	0	1	0	157
0	0	0	1	5	0	0	0	0	0	0	0	0	0	1	5	0	0	0	0	0	0	158
0	0	0	4	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	159
19	0	10	1	0	0	24	0	0	0	0	0	0	0	1	1	0	0	0	0	52	4	160
0	0	1	0	0	0	5	0	0	0	1	0	0	0	3	0	0	0	0	0	8	1	161
0	1	2	2	0	0	1	0	0	0	40	0	0	0	2	1	0	0	0	0	0	0	162
3	0	9	1	151	0	1	0	0	0	5	0	0	0	4	1	1	1	0	0	16	0	163
0	0	1	1	79	0	0	0	0	0	8	0	0	0	1	1	0	0	0	0	14	0	164
0	0	1	0	2	5	0	0	0	0	3	0	0	0	2	2	0	0	0	0	3	2	165
0	0	0	0	0	0	0	0	0	0	1	0	0	0	5	1	0	0	0	0	0	0	166
0	0	0	0	0	0	0	0	0	0	13	1	0	0	1	0	0	0	0	0	0	0	167
0	1	2	0	27	1	1	0	0	0	3	0	0	0	1	1	0	1	0	0	3	0	168
2	0	5	0	10	0	5	0	0	0	14	0	0	0	0	0	0	0	0	0	8	0	169
0	0	0	1	19	1	0	0	0	0	17	2	0	0	4	4	0	0	0	0	0	0	170
0	0	1	2	33	0	0	0	0	0	0	0	0	0	4	4	0	0	3	0	0	0	171
3	0	1	0	1	0	14	0	0	0	14	0	0	0	8	3	0	0	0	0	1	0	172
0	0	0	1	16	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	173
100	80	124	136	1635	4	601	1	9	0	485	7	15	9	226	495	10	17	26	2	572	18	174
0	0	0	0	2	0	55	0	0	0	3	0	0	0	0	0	0	0	0	0	45	1	175
1	0	1	4	5	0	5	0	0	0	5	0	0	0	6	5	0	0	0	1	1	0	176
2	2	3	1	0	0	0	0	0	0	0	0	0	0	2	1	0	0	1	0	1	0	177
0	0	0	0	1	0	0	0	0	0	1	0	1	0	0	0	0	0	1	0	0	0	178
0	0	0	2	1	1	0	0	0	0	9	0	0	2	16	11	0	0	0	0	1	1	179
1	1	2	4	4	0	0	0	0	0	0	0	0	0	1	1	0	0	0	5	0	0	180
0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	2	0	1	0	0	0	0	181
1	1	4	2	3	0	55	0	0	0	6	0	0	0	0	0	1	1	0	0	26	0	182
0	1	1	0	47	0	0	0	0	0	21	0	0	0	0	2	0	0	0	0	5	0	183
3	0	2	1	8	0	0	0	0	0	17	0	1	1	0	0	1	1	1	0	0	0	184
0	0	0	0	0	23	0	0	0	0	1	0	0	0	1	0	1	0	0	0	1	0	185
0	0	3	1	5	0	18	0	0	0	9	0	1	0	2	2	0	0	0	0	42	0	186
0	0	0	2	16	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	20	0	187
1	1	0	2	38	1	3	0	0	0	10	0	0	1	0	0	0	0	0	0	0	1	188
0	1	2	1	0	0	0	0	0	0	8	0	0	0	1	1	0	0	0	0	1	0	189
0	0	0	0	2	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	190
0	0	0	0	11	0	1	0	0	0	11	1	0	1	3	1	0	0	5	0	14	0	191
0	0	0	4	6	0	33	0	0	0	1	0	0	0	0	1	1	1	0	0	41	1	192
0	0	0	1	2	1	0	0	0	0	3	0	0	0	2	1	1	0	0	0	0	0	193
0	0	0	0	4	0	25	0	0	0	4	0	0	0	0	2	0	1	0	0	3	0	194
0	1	1	0	2	0	0	0	0	1	2	0	0	0	1	2	0	0	0	0	6	0	195
0	0	0	0	31	0	0	0	0	0	3	0	0	0	1	0	0	1	1	0	16	0	196
0	0	0	0	65	0	12	0	0	0	3	0	0	0	31	1	0	0	0	0	25	0	197
0	0	0	1	2	0	0	0	0	0	5	0	0	0	4	8	0	0	0	0	5	1	198
0	0	7	5	1	0	0	0	0	0	6	0	0	0	1	0	0	0	0	0	0	0	199
4	1	8	0	39	0	0	1	4	0	4	0	0	0	2	3	0	0	0	0	1	0	200
0	0	1	1	1	0	1	0	0	0	9	0	0	0	1	16	34	0	2	0	0	0	201
0	0	0	0	24	0	1	0	0	0	9	0	0	0	1	2	0	0	0	0	0	0	202
0	0	0	5	0	1	0	0	0	0	3	0	0	0	0	0	0	0	0	0	14	1	203
0	0	0	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	204
0	1	0	0	0	0	1	0	0	0	1	0	0	0	1	1	0	1	0	0	0	0	205
0	0	0	3	23	0	1	0	0	0	13	0	0	0	0	0	0	0	1	0	0	0	206
3	4	1	1	4	0	0	0	0	0	4	0	0	0	1	1	0	0	0	0	0	0	207
0	0	2	1	5	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	208
0	0	0	2	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	209
0	3	8	5	0	2	0	0	2	0	28	0	1	0	5	0	0	1	0	0	0	0	210
0	1	0	0	0	0	36	0	0	0	8	0	0	0	4	1	0	0	0	0	31	0	211
0	0	1	1	1	0	3	0	0	0	3	0	0	0	1	1	0	0	0	0	0	0	212
0	0	0	0	1	0	0	0	0	0	0	0	0	0	7	91	0	0	0	0	0	0	213
0	0	0	0	4	8	0	0	0	0	2	0	0	0	1	3	0	1	0	0	0	1	214
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	215
0	0	0	1	0	0	0	0	0	0	2	0	0	0	0	2	0	0	0	0	0	0	216
0	0	0	0	6	2	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	217
0	1	1	0	1	0	0	0	0	0	3	0	0	0	3	3	0	0	0	0	3	0	218
0	0	1	1	174	0	0	0	0	0	2	0	0	0	1	2	0	0	0	0	2	0	219
0	0	0	1	0	0	1	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	220
0	0	0	2	4	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	2	0	221
0	0	1	0	67	0	0	0	0	0	0	0	0	0	1	0	0	1	1	0	0	0	222
0	0	0	2	1	0	0	0	0	0	3	1	0	0	0	1	0	0	0	0	0	0	223
0	1	0	0	13	0	0	0	0	0	5	1	0	0	0	0	0	0	0	0	1	0	224
0	1	3	1	78	0	29	0	0	0	3	0	0	1	6	2	1	0	0	0	2	0	225
0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	226
0	3	0	0	0	0	1	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	227
0	2	6	1	12	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	15	0	228
0	1	1	0	2	0	52	0	0	0	0	0	0	0	3	1	0	0	0	0	3	0	229

Cases and Deaths from Diseases Dangerous

Line No.	CITIES AND TOWNS GROUPED IN ORDER OF POPULATION.	Popu- lation esti- mated as of July 1, 1923.	22 An- terior Poli- mye- litis.		25A Chick- en Pox.		10 Diph- theria.		24 Ep- Cere- bro- spinal Mening- itis.		25B Ger- man Meas- les.		40 Gonor- rhea.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
232	Erving	1,389	0	0	0	0	4	2	0	0	0	0	1	0
233	Dennis	1,386	0	0	5	0	0	0	0	0	1	0	0	0
234	Pembroke	1,372	0	0	0	0	0	0	0	0	0	0	0	0
235	Lakeville	1,367	0	0	3	0	0	0	0	0	0	0	0	0
236	Buckland	1,361	0	0	1	0	1	0	0	0	0	0	0	0
237	Bedford	1,359	0	0	3	0	3	0	0	0	0	0	2	0
238	Russell	1,335	0	0	0	0	0	0	0	0	0	0	0	0
239	Plainville	1,334	0	0	0	0	0	0	0	0	1	0	0	0
240	Essex	1,331	0	0	0	0	2	0	0	0	0	0	0	0
241	Whately	1,318	0	0	0	0	4	0	1	0	0	0	1	0
242	Sunderland	1,296	0	0	0	0	2	1	0	0	0	0	0	0
243	Littleton	1,292	0	0	1	0	17	0	0	0	0	0	0	0
244	Westwood	1,292	0	0	0	0	0	0	0	0	0	0	2	0
245	Duxbury	1,283	0	0	5	0	0	0	0	0	2	0	0	0
246	North Reading	1,282	0	0	0	0	15	0	0	0	0	0	0	0
247	West Brookfield	1,277	0	0	0	0	0	0	0	0	0	0	2	0
248	Chester	1,271	0	0	0	0	1	0	0	0	0	0	0	0
249	Nahant	1,269	0	0	0	0	0	0	0	0	0	0	1	0
250	Tisbury	1,240	0	0	3	0	0	0	0	0	2	0	0	0
251	Sterling	1,232	0	0	2	0	1	0	0	0	0	0	0	0
252	Mattapoisett	1,221	0	0	0	0	0	0	0	0	0	0	0	0
253	Lynnfield	1,204	0	0	0	0	0	1	0	0	0	0	0	0
254	Marshfield	1,197	0	0	21	0	1	0	0	0	0	0	4	0
255	Norwell	1,190	0	0	0	0	0	0	0	0	1	0	0	0
256	Westminster	1,158	0	0	0	0	1	0	0	0	0	0	0	0
257	Clarksburg	1,153	0	0	0	0	0	0	0	0	0	0	0	0
258	Marion	1,141	0	0	4	0	0	0	0	0	0	0	1	0
259	Edgartown	1,127	0	0	0	0	0	0	0	0	0	0	1	0
260	Sheffield	1,120	0	0	1	0	0	0	0	0	0	0	0	0
261	Middleton	1,111	0	0	0	0	0	0	0	0	0	0	0	0
262	Wenham	1,107	0	0	0	0	0	0	0	0	0	0	0	0
263	Tyngsboro	1,100	0	0	44	0	1	0	0	0	0	0	0	0
264	Newbury	1,093	0	0	0	0	1	0	0	0	0	0	0	0
265	Yarmouth	1,093	0	0	0	0	0	0	0	0	0	0	1	0
266	Stow	1,083	0	0	1	0	2	0	0	0	0	0	0	0
267	Rowley	1,081	0	0	0	0	0	0	0	0	0	0	0	0
268	Norfolk	1,079	0	0	1	0	0	0	0	0	1	0	1	0
269	Southwick	1,068	0	0	0	0	0	0	0	0	0	0	0	0
270	Sudbury	1,058	0	0	0	0	0	0	0	0	0	0	0	0
271	Lanesboro	1,029	0	0	0	0	1	1	0	0	0	0	0	0
272	Hubbardston	1,017	1	1	0	0	0	0	0	0	0	0	1	0
273	New Marlboro	1,000	0	0	8	0	1	0	0	0	0	0	0	0
274	Burlington	983	0	0	0	0	1	1	0	0	0	0	1	0
275	Mendon	982	0	0	0	0	0	0	0	0	0	0	0	0
276	Rochester	963	0	0	8	0	0	0	0	0	0	0	0	0
277	Lincoln	946	0	0	1	0	0	0	0	0	0	0	1	0
278	Hinsdale	925	0	0	0	0	0	0	0	0	0	0	0	0
279	Oak Bluffs	900	0	0	0	0	0	1	0	0	0	0	1	0
280	Orleans	900	0	0	0	0	0	0	0	0	0	0	0	0
281	Berkley	900	0	0	0	0	0	0	0	0	0	0	0	0
282	East Brookfield	900	0	0	0	0	0	0	0	0	1	0	0	0
283	West Stockbridge	897	0	0	0	0	0	0	0	0	0	0	0	0
284	Berlin	871	0	0	0	0	0	0	0	0	0	0	0	0
285	Gill	827	0	0	2	0	0	0	0	0	0	0	1	0
286	Boylston	801	0	0	0	0	0	0	0	0	0	0	0	0
287	Royalston	788	0	0	0	0	0	0	0	0	0	0	1	0
288	Enfield	779	0	0	0	0	0	0	0	0	0	0	0	0
289	Ashfield	778	2	0	0	0	0	0	1	0	0	0	0	0
290	Conway	772	0	0	0	0	0	0	0	0	0	0	0	0
291	Ashby	771	0	0	0	0	1	0	0	0	0	0	0	0
292	Dover	769	0	0	0	0	0	0	0	0	0	0	0	0
293	Bernardston	755	0	0	1	0	0	0	0	0	0	0	0	0
294	Wellfleet	746	0	0	0	0	0	0	0	0	0	0	0	0
295	Granby	744	0	0	0	0	4	0	0	0	0	0	0	0
296	Charlmont	720	0	0	0	0	0	1	0	0	0	0	0	0
297	Southampton	713	0	0	0	0	0	0	0	0	0	0	0	0
298	Topsfield	700	0	0	0	0	0	0	0	0	0	0	1	0
299	Brimfield	663	0	0	0	0	3	2	0	0	0	0	1	0
300	Bolton	663	0	0	0	0	0	0	0	0	0	0	0	0
301	Leverett	632	0	0	0	0	0	0	0	0	0	0	0	0
302	Brewster	618	0	0	1	0	0	0	0	0	1	0	0	0
303	Princeton	595	0	0	0	0	0	0	0	0	0	0	2	0
304	Hampden	589	0	0	0	0	1	0	0	0	0	0	0	0
305	Petersham	579	0	0	1	0	0	0	0	0	0	0	2	0
306	Granville	561	0	0	0	0	0	0	0	0	0	0	0	0
307	Richmond	558	0	0	0	0	0	0	0	0	0	0	0	0
308	Becket	517	0	0	0	0	3	0	0	0	0	0	2	0

to the Public Health, 1923 — Continued.

11		101		7		13		40A		8		38		31, 37 37A, 37B		32-36E		1		9		Line No.
Influenza.		Lobar Pneumonia.		Measles.		Mumps.		Ophthalmia Neonatorum.		Scarlet Fever.		Syphilis.		Tuberculosis, Pulmonary.		Tuberculosis, Other Forms.		Typhoid Fever.		Whooping Cough.		
Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	
2	1	2	2	7	0	0	0	0	0	1	0	0	1	2	1	0	0	0	0	0	0	232
0	0	3	3	3	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	2	0	233
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	234
0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	235
0	0	3	0	0	0	0	0	0	0	6	1	0	0	0	0	0	0	0	0	0	0	236
0	0	0	1	0	0	0	0	0	0	6	0	0	0	0	0	0	0	1	1	9	0	237
2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	238
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	239
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	240
0	0	0	0	0	0	51	0	0	0	3	0	0	0	0	0	0	0	1	0	2	0	241
0	0	0	0	0	0	5	0	0	0	0	0	0	0	3	0	0	0	0	0	3	0	242
0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	243
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	244
0	0	1	0	0	0	9	0	0	0	0	0	0	0	3	1	0	0	0	0	47	0	245
0	0	0	0	0	0	1	0	0	0	14	0	0	0	0	0	1	1	0	0	0	0	246
0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	4	0	247
0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	248
0	0	0	0	0	0	1	1	0	0	2	0	0	0	0	2	7	0	0	0	0	0	249
9	2	3	2	1	1	0	2	0	1	0	0	0	0	3	4	0	1	0	0	0	0	250
0	0	0	0	0	0	35	0	2	0	4	0	0	0	0	3	0	0	1	0	6	0	251
0	0	1	3	0	0	77	0	0	0	0	0	0	0	0	0	0	0	0	0	61	0	252
0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	253
0	0	0	0	0	0	4	0	3	0	0	0	1	0	0	2	0	0	1	0	7	0	254
2	4	2	0	0	0	23	0	0	0	0	0	1	0	1	1	2	0	2	0	0	0	255
0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	256
0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	257
8	0	2	2	22	0	4	0	0	0	1	0	0	0	2	0	0	0	0	0	8	0	258
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	259
0	0	2	1	1	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	260
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	0	261
50	1	0	5	44	0	50	0	0	0	5	0	0	0	3	1	0	0	0	0	1	0	262
0	0	0	2	11	0	0	3	0	0	7	0	0	0	0	0	0	0	2	0	0	0	263
0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	264
0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	265
0	0	0	0	0	0	0	0	0	0	2	1	1	0	0	0	0	0	1	0	0	0	266
0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	267
0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	2	268
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	269
0	0	0	0	0	0	4	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	270
0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	271
0	0	0	1	0	0	34	0	0	0	0	0	0	0	2	0	0	0	0	0	1	0	272
0	0	0	0	0	0	11	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	273
0	0	0	0	0	0	1	0	0	0	2	0	0	0	1	0	0	0	0	0	0	0	274
0	0	0	0	0	0	18	0	0	0	1	0	0	0	0	0	0	0	0	0	7	0	275
0	0	0	0	0	0	35	0	0	0	3	0	0	0	0	0	0	0	0	0	12	0	276
0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	277
0	0	0	0	0	0	2	0	0	0	1	0	0	0	2	2	0	0	1	0	0	0	278
0	0	0	1	0	0	7	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	279
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	280
0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	1	0	0	0	0	0	281
0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	282
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	283
0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	284
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	285
0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	286
0	0	1	1	0	0	27	0	0	0	6	0	0	0	1	0	0	0	0	0	0	0	287
0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	288
4	3	0	0	4	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	289
0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	290
3	0	0	0	1	7	0	4	0	0	1	0	0	0	0	0	0	0	0	0	2	0	291
0	0	0	0	2	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	292
0	0	0	0	1	0	0	1	0	0	1	0	0	0	1	1	0	0	0	0	1	0	293
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	294
0	0	2	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	0	0	6	0	295
0	0	0	1	2	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	296
0	0	0	0	1	5	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	297
0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	298
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	299
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	300
0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	6	0	301
0	0	0	0	0	0	13	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	302
0	0	0	1	1	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0	1	1	303
0	1	0	0	0	0	0	0	0	0	9	0	1	0	0	0	0	0	0	0	2	0	304
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	305
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	306
0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	307
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	

Cases and Deaths from Diseases Dangerous

Line No.	CITIES AND TOWNS GROUPED IN ORDER OF POPULATION.	Popu- lation esti- mated as of July 1, 1923.	22 An- terior Poli- mye- litis		25A Chick- en Pox.		10 Diph- theria.		24 Ep. Cere- bro- spinal Mening- itis.		25B Ger- man Meas- les.		40 Gonor- rhea.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
309	Dana	515	0	0	3	0	0	0	0	0	1	0	0	0
310	Halifax	507	0	0	0	0	0	0	0	0	0	0	0	0
311	Pelham	506	0	0	0	0	0	0	0	0	0	0	0	0
312	Paxton	503	0	0	0	0	0	0	0	0	0	0	0	0
313	Boxford	497	0	0	0	0	0	0	0	0	0	0	0	0
314	Wales	479	0	0	0	0	0	0	0	0	0	0	0	0
315	Truro	474	0	0	0	0	0	0	0	0	0	0	0	0
316	Carlisle	442	0	0	0	0	2	0	0	0	0	0	0	0
317	Oakham	442	0	0	0	0	0	0	0	0	0	0	0	0
318	Hancock	429	0	0	0	0	0	0	0	0	0	0	0	0
319	New Salem	428	0	0	0	0	0	0	0	1	0	0	0	0
320	Windsor	424	0	0	0	0	0	1	0	0	0	0	0	0
321	Carver	400	0	0	0	0	0	0	0	0	0	0	0	0
322	Sandisfield	383	0	0	0	0	0	0	0	0	0	0	0	0
323	Greenwich	378	0	0	0	0	0	0	0	0	0	0	0	0
324	Blandford	374	0	0	0	0	0	0	0	0	0	0	0	0
325	Plympton	374	0	0	0	0	0	0	0	0	0	0	0	0
326	Savoy	373	0	0	0	0	0	0	0	0	0	0	0	0
327	Eastham	370	0	0	0	0	0	0	0	0	0	0	0	0
328	Cummington	363	0	0	1	0	0	0	0	0	0	0	0	0
329	Hawley	362	0	0	0	0	1	0	0	0	0	0	0	0
330	Chesterfield	354	0	0	0	0	0	0	0	0	0	0	0	0
331	New Braintree	352	0	0	0	0	1	0	0	0	0	0	0	0
332	Dunstable	346	0	0	0	0	0	0	0	0	0	0	0	0
333	Phillipston	329	0	0	0	0	0	0	0	0	0	0	0	0
334	Egremont	325	0	0	0	0	0	0	0	0	0	0	0	0
335	Leyden	320	0	0	0	0	0	0	0	0	0	0	0	0
336	Wendell	315	0	0	0	0	1	0	0	0	0	0	0	0
337	Otis	302	0	0	0	0	0	0	0	0	0	0	0	0
338	Plainfield	301	0	0	0	0	0	0	0	0	0	0	0	0
339	Heath	283	0	0	0	0	0	0	0	0	0	0	0	0
340	Boxboro	277	0	0	0	0	1	0	0	0	0	0	0	0
341	West Tisbury	275	0	0	0	0	0	0	0	0	0	0	0	0
342	Rowe	266	0	0	0	0	0	0	0	0	0	0	0	0
343	Worthington	255	0	0	0	0	0	0	0	0	0	0	0	0
344	Middlefield	248	0	0	0	0	0	0	0	0	0	0	0	0
345	Alford	231	0	0	0	0	0	0	0	0	0	0	0	0
346	Montgomery	229	0	0	0	0	0	0	0	0	0	0	0	0
347	Mashpee	228	0	0	0	0	0	0	0	0	0	1	0	0
348	Monterey	226	0	0	0	0	0	0	0	3	0	0	0	0
349	Tyringham	222	0	0	0	0	0	0	0	0	0	0	0	0
350	Warwick	218	0	0	0	0	1	0	0	0	0	0	0	0
351	Washington	215	0	0	0	0	0	0	0	0	0	0	0	0
352	Westhampton	214	0	0	0	0	0	0	0	0	0	0	0	0
353	Shutesbury	207	0	0	0	0	0	0	0	0	0	0	0	0
354	Chilmark	205	0	0	0	0	0	0	0	0	0	0	0	0
355	Florida	204	0	0	0	0	3	0	0	0	0	0	0	0
356	Prescott	190	0	0	17	0	0	0	0	0	0	0	0	0
357	Tolland	188	0	0	0	0	0	0	0	0	0	0	0	0
358	Goshen	175	0	0	0	0	0	0	0	0	0	0	0	0
359	Holland	149	0	0	0	0	0	0	0	0	0	0	0	0
360	New Ashford	134	0	0	0	0	0	0	0	0	0	0	0	0
361	Gay Head	123	0	0	0	0	0	0	0	0	0	0	0	0
362	Peru	114	0	0	0	0	0	0	0	0	0	0	0	0
363	Gosnold	114	0	0	0	0	0	0	0	0	0	0	0	0
364	Monroe	108	0	0	0	0	0	0	0	0	0	0	0	0
365	Mount Washington	56	0	0	0	0	0	0	0	0	0	0	0	0
366	TEWKSBURY STATE INFIRMARY		0	0	9	0	21	3	0	0	0	0	12	0

In addition to the above there occurred 6 cases of actinomycosis, with 4 deaths:

	Cases.	Deaths.
Boston	4	3
Cambridge	1	1
Springfield	1	—

7 cases of anthrax, with 2 deaths:

	Cases.	Deaths.
Concord	1	—
Lynn	1	2
Salem	1	—
Springfield	1	—
Stoneham	1	—
Woburn	2	—

252 cases of dog-bite (requiring anti-rabic treatment):

Amesbury	2	—
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	Cases.	Deaths.
Andover	2	—
Arlington	9	—
Attleborough	1	—
Ayer	1	—
Billerica	3	—
Boston	43	—
Braintree	1	—
Brockton	1	—
Cambridge	12	—
Chelsea	8	—
Chelmsford	1	—
Dartmouth	1	—
Dracut	3	—
Everett	7	—
Fall River	1	—
Grafton	1	—
Hingham	2	—

to the Public Health, 1923 — Concluded.

11		101		7		13		40A		8		38		31. 37 37A, 37B		32-36E		1		9		Line No.
Influenza.		Lobar Pneumonia.		Measles.		Mumps.		Ophthalmia Neonatorum. ¹		Scarlet Fever.		Syphilis.		Tuberculosis, Pulmonary.		Tuberculosis, Other Forms.		Typhoid Fever.		Whooping Cough.		
Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	
0	0	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	309
0	0	1	1	0	0	0	0	0	1	1	0	1	0	0	0	0	0	0	0	4	1	310
0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	311
0	0	0	1	0	0	0	0	0	0	8	0	0	0	0	0	0	1	0	0	0	0	312
0	0	0	0	11	0	1	0	0	0	2	0	0	0	1	1	0	0	0	0	0	0	313
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	314
0	0	0	0	0	0	0	6	0	0	7	0	0	0	1	0	0	0	0	0	0	0	315
0	0	0	0	2	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	316
0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	317
0	0	0	0	3	0	0	0	0	0	8	0	0	0	1	0	0	1	0	0	0	0	318
0	0	0	2	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	3	0	319
0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	320
0	0	0	0	37	0	1	0	0	0	5	0	0	0	2	0	0	0	0	0	0	0	321
0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	322
0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	323
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	324
0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	325
0	0	0	0	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	326
0	0	0	1	1	0	21	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	327
0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	328
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	329
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	330
0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	331
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	332
0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	333
0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	334
0	0	1	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	335
0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	336
0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	337
0	0	0	0	1	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	338
0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	339
0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	340
1	1	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	341
0	1	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	342
0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	343
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	344
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	345
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	346
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	347
0	0	6	2	4	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	348
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	349
0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	350
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	351
0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	352
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	353
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	354
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	355
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	356
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	357
0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	358
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	359
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	360
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	361
0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	362
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	363
0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	364
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	365
0	0	13	9	0	0	3	0	1	0	6	0	3	14	48	68	6	4	2	0	4	1	366

	Cases.	Deaths.
Holyoke	2	—
Hudson	2	—
Lawrence	1	—
Lowell	72	—
Lynn	1	—
Malden	4	—
Mansfield	4	—
Medford	17	—
Melrose	6	—
Methuen	3	—
Montague	1	—
Needham	2	—
Newton	2	—
North Attleborough	1	—
Quincy	1	—
South Hadley	8	—

	Cases.	Deaths.
Somerville	2	—
Tewksbury State Infirmary	3	—
Upton	1	—
Waltham	4	—
Watertown	1	—
Wellesley	1	—
Winchester	3	—
Winthrop	10	—
Worcester	1	—
3 cases of dysentery, with 2 deaths:		
Boston	1	2
Fall River	1	—
Winthrop	1	—

180 cases of encephalitis lethargica, with 85 deaths:

	Cases.	Deaths.
Arlington	2	1
Boston	53	23
Bourne	2	2
Braintree	2	—
Brockton	1	—
Brookline	1	—
Cambridge	11	5
Chelsea	1	—
Chicopee	—	1
Clinton	3	—
Concord	1	1
Danvers	1	1
Dighton	1	1
Dracut	1	1
Everett	3	1
Fall River	4	2
Fitchburg	1	1
Framingham	1	—
Gloucester	—	1
Holden	3	1
Holyoke	2	2
Hudson	—	2
Lawrence	1	2
Leominster	1	1
Lowell	2	1
Lynn	7	1
Malden	1	—
Marlboro	2	1
Melrose	1	—
Millbury	3	1
Milton	2	1
Montague	—	1
New Bedford	5	1
Newburyport	—	1
Newton	1	1
North Attleborough	—	1
Norwood	1	—
Pittsfield	1	—
Plymouth	1	—
Quincy	2	2
Revere	—	2
Somerville	2	1
Stoneham	1	—
Springfield	6	2
Stow	1	1
Swampscott	1	—
Taunton	7	2
Tewksbury	1	—
Uxbridge	1	—
Waltham	1	—
Watertown	—	1
Webster	1	—
Westfield	1	—
Williamstown	3	4
Winchendon	1	1
Winchester	1	—
Worcester	27	10

12 cases of hookworm:

Boston	11	—
Cambridge	1	—

1 case of leprosy:

Wareham	1	—
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23 cases of malaria, with 3 deaths:

Barnstable	1	—
Boston	9	—
Brockton	1	—
Cambridge	2	—
Haverhill	1	—
Lowell	1	1
Middleboro	2	—
Newton	—	1
Newburyport	1	—
North Brookfield	—	1
Norwood	1	—
Pittsfield	1	—
Somerville	1	—
Springfield	1	—
Walpole	1	—

16 cases of pellagra, with 11 deaths:

	Cases.	Deaths.
Boston	8	6
Danvers	1	—
Lowell	1	1
Newton	1	1
Northampton	2	—
Peabody	1	1
Tewksbury State Infirmary	2	2

3 cases of rabies, with 1 death:

Boston	2	1
Lynn	1	—

197 cases of septic sore throat, with 27 deaths:

Acushnet	1	—
Arlington	69	—
Bedford	1	—
Belmont	3	1
Boston	43	11
Brockton	2	1
Brookline	1	—
Cambridge	8	—
Cohasset	—	1
Douglas	1	—
Fall River	9	—
Framingham	1	—
Gardner	1	—
Gloucester	—	1
Greenfield	1	—
Haverhill	5	—
Holyoke	2	—
Lawrence	4	3
Lexington	1	—
Lowell	4	3
Lunenburg	2	—
Lynn	2	—
Mansfield	1	1
Medford	4	—
New Bedford	4	1
Newburyport	2	—
Northbridge	2	—
Peabody	1	—
Quincy	3	—
Salem	1	1
Somerville	3	—
Springfield	2	2
Townsend	3	—
Waltham	2	—
Weymouth	1	—
West Newbury	1	—
Williamsburg	1	—
Winthrop	2	—
Worcester	3	1

6 cases of smallpox:

Adams	4	—
Malden	1	—
New Bedford	1	—

28 cases of tetanus, with 18 deaths:

Arlington	1	—
Boston	4	3
Cambridge	2	—
Chester	1	—
Foxborough	1	1
Fall River	2	1
Haverhill	—	1
Holden	1	—
Ipswich	1	1
Lawrence	1	1
Lowell	1	1
Lynn	1	1
Milford	1	1
Natick	1	—
New Bedford	2	1
North Adams	1	1
Northampton	1	1
Springfield	2	2
Sudbury	—	1
Waltham	1	—
Watertown	1	—
Westfield	1	—
Worcester	1	1

62 cases of trachoma:

	Cases.	Deaths.
Arlington	2	-
Attleboro	1	-
Boston	29	-
Chicopee	1	-
Clinton	1	-
Cambridge	4	-
Chelsea	1	-
Fitchburg	2	-
Haverhill	1	-
Holyoke	1	-
Lowell	7	-
Lynn	2	-
Malden	2	-
Milford	2	-
Newburyport	1	-

Cases. Deaths.

Peabody	1	-
Waltham	1	-
Watertown	1	-
Worcester	2	-

13 cases of trichinosis:

Boston	6	-
Bridgewater	1	-
Brockton	1	-
Cambridge	1	-
Everett	3	-
Leominster	1	-

1 case of typhus fever:

Boston	1	-
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Report of the Division of Biologic Laboratories.

Benjamin White, Ph.D., *Director.*

Elliott S. Robinson, M.D., Ph.D., *Assistant Director.*

William A. Hinton, M.D., *Assistant Director.*

I. ANTITOXIN AND VACCINE LABORATORY.

1. Production and Distribution.

The accompanying table shows the amounts of the various biologic products distributed during the fiscal years 1920, 1921, 1922 and 1923.

	1920.	1921.	1922.	1923.
Diphtheria Antitoxin, 1,000 unit doses	218,227	261,024	336,730	411,507
Antimeningococcic Serum, 15 c.c. doses	3,585	3,444	4,296	4,609
Antipneumococcic Serum, 100 c.c. doses	444	649	721	336
Smallpox Vaccine, doses	189,064	197,733	189,215	197,767
Bacterial Vaccine, doses	49,191	55,804	66,959	60,976
Schick Outfits, 50 doses each	126	547	3,235	5,875
Diphtheria Toxin for Schick Test (bulk, c.c.)	—	32	155½	170
Diphtheria Toxin-Antitoxin Mixture, doses	3,614	9,414	96,407	174,589
Normal Serum, c.c.	—	9,788	4,665	7,670

The outstanding features are the large increase in the amounts of diphtheria antitoxin, Schick outfits and diphtheria toxin-antitoxin mixture distributed. The intensive antidiphtheria campaign carried on by the Department has undoubtedly led to the wider use of diphtheria antitoxin for the treatment of diphtheria and for the immunization of contacts. The effects of the campaign are still more evident in the marked increase in the number of Schick outfits and in the quantity of diphtheria toxin-antitoxin mixture. The popularization of diphtheria prevention work has stimulated a lively interest among the medical profession and the public and there is every reason to hope that the application of these two measures will soon show a gratifying influence in decreasing the number of cases of and deaths from diphtheria.

2. Improvements.

(a) *Plant and Equipment.*—The physical appearance of the laboratory and stable rooms has been greatly improved and many devices have been installed for saving labor and for making possible the handling of the greatly increased distribution with a minimum of extra labor.

(b) *Methods and Production.* (1) *Immunization of Horses.*—The investigation begun two years ago as to the most efficient methods for immunizing horses for the production of diphtheria antitoxin has borne fruit, and never before in the history of the laboratory have the horses produced on the average such high potency serum. This improvement has made it possible to meet the increased demand for antitoxin with the same number of horses carried in previous years.

(2) *Concentration of Antitoxin.*—With the more potent antitoxic plasma available and with refinements in the method of concentration, it has been possible to produce antitoxin of much higher unitage than formerly. Many lots exceeding 2,000 units per cubic centimeter have been distributed, reducing considerably the bulk of the injections, with a consequent lessening of discomfort to the patient. Further improvements of the method are under way, with a view to lessening the loss of units incident to the process.

(3) *Vaccine Virus.*—Although the manufacture of vaccine virus has become stabilized, conforming in every way to the regulations of the U. S. Public Health Service, certain minor details in the process have been changed, resulting in a larger yield of a more potent product.

(4) *Bacterial Vaccine.*—In order to reduce the sometimes unpleasant local and constitutional reactions following the administration of typhoid-paratyphoid vaccine, the method of preparing the stock emulsions has been changed and now the organisms are thoroughly washed before being incorporated in the vaccine. It has been found that this improvement has resulted in lessening the number of these undesirable reactions.

(5) *Schick Outfits.*—The package of this product has been simplified resulting in a 50 per cent reduction in cost of material and an equal reduction in the labor required in assembling the outfit.

(6) *Diphtheria Toxin-Antitoxin Mixture*.—The uniformly successful results attending the use of this product attest both its harmlessness and its immunizing power. Frequent conferences have been held with various authorities and it now seems wise to discontinue the 3 L+ mixture and to distribute the 1 L+ or ½ L+ mixture for the immunization of children, and the 1/10th L+ mixture as recommended by Park for the immunization of all persons over ten years of age. During the past year the Federal Government has revised its regulations regarding this product and now all lots distributed must, in addition to passing our laboratory tests satisfactorily, be tested and approved by the U. S. Hygienic Laboratory before release.

(c) *Packages*.—For all antitoxins, serums and bulk containers of bacterial vaccine and diphtheria toxin-antitoxin mixture, uniform narrow-neck glass vials with special rubber stoppers and sterile seals have been substituted for the old-fashioned bottles with cork stoppers. This change has facilitated production and has delivered our products to the physician in more convenient form and in a container less liable to accidental contamination. Bottles of a high grade of resistance glass are being used to prevent the weakening of products, which invariably takes place in glass containers of inferior grade. Cork stoppers have been discontinued in the containers for all products having lengthy expiration periods, thus lessening deterioration of the products.

(d) *Service*.—Emergency supply stations carrying diphtheria antitoxin, anti-pneumococcic (Type I) and antimeningococcic serums have been established at the following hospitals:

Boston City Hospital, 818 Harrison Avenue, Boston.
 Carney Hospital, Old Harbor Street, South Boston.
 Massachusetts General Hospital, Fruit Street, Boston.
 Massachusetts Homeopathic Hospital, East Concord Street, Boston.
 Peter Bent Brigham Hospital, 721 Huntington Avenue, Boston.
 St. Elizabeth's Hospital, 736 Cambridge Street, Brighton.

The laboratory has also offered to test strains of meningococci from cases of meningitis for the purpose of selecting a lot of serum especially applicable to the type of organism found.

3. Expenses.

The comparative amounts spent for personal services and expenses for 1920, 1921, 1922 and 1923 follows:

	1920.	1921.	1922.	1923.
Personal Services	\$23,094.16	\$28,610.41	\$30,690.50	\$35,229.51
Expenses	23,742.37	24,500.46	29,360.80	30,001.73
	\$46,836.53	\$53,110.87	\$60,051.30	\$65,231.24

The increase in the amount for personal services and expenses is far below the increases in personnel and production. The increased salaries granted to the permanent workers constitute a just recognition of long and faithful services and have brought the salaries nearer a grade representing adequate compensation for the work done. The salary scale throughout is still somewhat too low for the qualifications demanded and for the quantity and quality of work performed. The greatest part of the increase for this item has been necessitated by the appointment of additional workers demanded by the increased production. Further attempts to hold expenditures to a minimum in face of the greatly increased output of products have been made and considerable economies have been effected through the utilization of the facilities of the State Purchasing Agent and by buying supplies in larger quantities and on competitive quotations.

4. Personnel.

In August, Elliott S. Robinson, Ph.D., M.D., of the Yale School of Medicine, was appointed assistant director in place of Dr. Robert N. Nye, resigned.

The laboratory suffered a great loss in the sudden death of Mr. Harry I. Guilford, who had been in the employ of the laboratory for sixteen years. His place has been filled by Gerald F. O'Malley, D.V.M., and through his appointment the laboratory now has the full-time services of a veterinarian.

The great demand for products has required the constant employment of a

number of emergency workers, who it is hoped can now be put on permanent appointments.

Full credit should be given to the diligence, industry and loyalty of the workers of this laboratory who have made possible the large distribution of products during the past year. The time records show an amount of overtime work which should not pass unnoticed.

5. Educational Activities.

(a) *Investigation.* — The heavy demands made upon the laboratory for products have made it impossible to carry on as much investigative work as was planned, but in spite of this demand, research work has been prosecuted with profit. Dr. Jules Freund, a fellow of the International Health Board, and a student at the Harvard School of Public Health, developed an improved method for obtaining plasma for therapeutic and diagnostic purposes. Mr. Laurence Snyder of the Bussey Institute, made a study of iso-hemagglutinins in rabbits, and Dr. Karel Urbanek, a fellow of the International Health Board and a student at the School of Public Health, has throughout the year carried on an investigation on the propagation and cultivation of vaccine virus. A study has also been made on various methods for immunizing horses for the production of diphtheria antitoxin and also for the production of antipneumococcic serum.

The following papers by members of the staff and students have been published: Benjamin White: Smallpox and Vaccination. *Boston Medical and Surgical Journal*, Vol. 188, No. 15, pp. 523-530, April 12, 1923.

Jules Freund: New Method for Increasing Yield of Therapeutic and Diagnostic Serum. *Journal of Infectious Diseases*, Vol. 33, No. 4, October, 1923, pp. 328-330.

(b) *Teaching.* — Fifteen students from the International Health Board and from the Harvard School of Public Health have been received for a course of instruction in the theory and technic of the manufacture of biologic products. An intensive course in practical immunity was given during the summer to students in the School of Public Health and from the Medical School of Harvard University, and shorter courses have been given to students from various institutions, and to visitors from several foreign countries including representatives of the Division of Public Health of the League of Nations and to the visiting Medical Commission from Japan.

(c) *Demonstrations.* — Fourteen demonstrations of the manufacture of biologic products have been given to approximately 448 persons, including students from medical schools, from Simmons and Wellesley and to groups of nurses from various hospitals and colleges.

(d) *Clinics and Addresses.* — Thirty-six addresses have been given to medical societies, health and school officials and to the public in the following places before audiences totalling 4,171: Allston, Boston, Bridgewater, Brookline, Cambridge, East Boston, Fitchburg, Grafton, Greenfield, Melrose, Northampton, Pittsfield, Quincy, Reading, Roxbury, Salem, Springfield, Turners Falls, Waltham, Watertown, West Barnstable, Westboro, Wilmington.

6. Needs.

If this laboratory is to expand and to meet the demands made upon it the following needs must be provided for:

(1) A larger appropriation for expenses to cover the actual materials, containers and incidentals required by the increased distribution.

(2) An increased appropriation for personal services both to provide more adequate compensation for the present staff as well as for the employment of additional workers.

(3) A new laboratory and additional stable quarters are imperative. Whereas the laboratory force numbered 17 in 1920, there are now 34 employes, resulting in a crowding of the building and in insufficient space for carrying out the various processes and operations in the laboratory. We need at least once again the amount of laboratory space now available. The stable accommodations should be increased by one-third and a new quarantine stable should be provided. The present laboratory building is so small that it is impossible to have a much-needed chemical laboratory, and a labelling and packing department, and it is out of the question

to provide suitable space for research workers. The laboratory will only partly fulfil its proper function unless we are able to take advantage of the unusual opportunities for investigative work. The students from the Harvard Medical School, the School of Public Health, the International Health Board and other educational institutions frequently desire to carry on original research work here, but only a very limited number can be taken owing to the lack of facilities. It is earnestly hoped that during the coming year this situation will be met and adequate quarters will be provided.

II. WASSERMANN LABORATORY.

The work of the Wassermann Laboratory for the year 1923 continues to show a marked increase in the number of its tests. As will be noted from the accompanying table, which shows the work of the laboratory for the past five years, there were 58,453 tests for 1923 compared with 49,937 in 1922.

It is gratifying to note to what extent the efficiency of the personnel has improved during the past year. This improvement is due to the more liberal salaries which have been granted, resulting in a much smaller turnover of labor and in the encouragement of the permanent members of the staff.

It is also gratifying to report that the total cost per test of 31 cents for 1922 has been reduced to 28 cents during the year 1923.

	1919.	1920.	1921.	1922.	1923.
Wassermann tests	31,485	36,953	42,679	47,488	56,214
Gonococcus fixation tests	222	1,726	1,703	1,476	1,542
Lange's colloidal gold tests	—	—	82	157	105
Diagnostic examinations for the division of animal industry					
(a) Complement fixation tests for glanders	122	221	125	279	145
(b) Examinations for rabies	84	166	277	482	413
(c) Pathologic and bacteriologic examinations	79	64	50	55	34
	31,992	39,130	44,916	49,937	58,453

Besides the work shown in this table the laboratory has cooperated as usual with many laboratories throughout the State by furnishing them with materials to aid them in their attempts to maintain a uniform standard of excellence in the performance of the Wassermann reaction.

In addition to these routine activities, the laboratory has spent a great deal of time on an attempt to devise a means of preventing the decomposition of specimens of blood which are sent to us by mail or express. Although this study has yielded no encouraging results, our recent investigation of the Kahn precipitation test for syphilis leads us to hope that it may be substituted as a means for testing specimens of blood which are partially and, in some cases, greatly decomposed. Our study of the Kahn test, the Sachs-Georgi, and the Meinicke reactions has taught us that the Kahn precipitation method is almost strictly comparable in its results to those obtained in our own Wassermann reaction. Furthermore, specimens of blood which are almost completely hemolyzed thus far have given reactions when subjected to the Kahn test strictly comparable to those obtained from fresh specimens of the same blood when tested by either the Wassermann or Kahn test. If we can succeed in establishing the Kahn reaction for testing only decomposed and hemolyzed specimens of blood, we shall overcome the greatest difficulty which the laboratory has encountered in giving reliable service to such institutions and particularly to those practising physicians who must resort to express or mail as a means of transmitting specimens to us. Fully 15 per cent of all specimens of blood sent us reach the laboratory in a condition unsuitable for the Wassermann reaction. This study is being continued.

Original investigations have been begun on certain phases of hemorrhagic septicaemia and some preliminary experiments have been undertaken in the hope that some leads might be developed along which certain problems of rabies infections might profitably be studied.

The most satisfactory features of the year's work has been the reorganization and stabilization of the personnel, made possible by the salary increases granted. There are still certain inadequacies, and steps to put the whole salary scale on a more satisfactory basis have been taken in making recommendations for appropriations for the coming year.

Report of Division of Hygiene

Merrill E. Champion, M.D., *Director*.

Mary R. Lakeman, M.D., *Assistant Director*.

The activities of the Division of Hygiene for the year 1923 will be discussed under the following headings:

- | | |
|------------------------------------|-------------------------------|
| (a) Maternal and Infant Hygiene. | (d) Mouth Hygiene. |
| (b) Pre-School and School Hygiene. | (e) Health Education. |
| (c) Nutrition. | (f) Miscellaneous Activities. |

MATERNAL AND INFANT HYGIENE.

The work of this Division under the special appropriation for maternal and infant hygiene was begun in August, 1922. A certain amount of time was necessarily spent in obtaining proper personnel and drawing up a plan of action. We have, however, now completed a full year's activity.

Our purpose was (1) to make a complete field study of all maternal deaths occurring in the State, and as complete a study as possible of infant deaths. In the latter case we could hope to cover only a relatively small proportion of the problem because of its size. (2) We proposed to make a careful field study of all the child hygiene activities now being carried on by the different municipalities through both official and unofficial agencies. (3) Acting on the information obtained from (2) we planned to stimulate the different municipalities to start new work or to fill in the gaps which were evident in work already being carried on.

Turning now to the study of maternal deaths, we have had three whole-time women physicians who will shortly have made a detailed study of every maternal death occurring during the years 1922 and 1923. This study is not quite completed because of the fact that the death certificates for the latter part of 1923 are not yet available. The physicians started out on their study with such facts before them as could be obtained from the death certificates filed in the office of the Registrar of Vital Statistics which, it will be recalled, is part of the Secretary of State's office. The physicians then visited the local physician in charge of the case to be studied and talked the matter over with him in order that any new light which he could throw upon the cause of death might be available for our records. If the patient died in a hospital the hospital records were consulted. The home of the deceased patient was visited in order that the social background might be available. With this information in hand each case has been gone over carefully, in an attempt to reach the decision as to whether or not this was a preventable death and if so, what measures would have been instrumental in preventing it. In the case of the city of Boston the study of maternal and infant deaths was left to the local Commissioner of Health at his request.

As a corollary to this study of maternal deaths visits were made by our physicians to all the lying-in hospitals of the State in order to form an idea as to the adequacy of this type of service. Every effort was made to cooperate in this work with the Department of Public Welfare which, under the law, is the licensing body for maternity hospitals.

It is too early yet to report upon the result of our studies of the causes of maternal mortality. Early in the spring of 1924, however, we expect to have completed our detailed study of two years' cases. A careful analysis will then be made of all the facts available to us and the results will be published, we hope, by early summer.

Survey of Local Child Hygiene Activities. — This work has been carried on by a group of nurses. The *modus operandi* has been to go into a community and to study the official records according to a plan laid out in the form of a questionnaire. When this questionnaire has been completed a pretty thorough knowledge has been available as to what a given community is accomplishing in the way of promoting child hygiene. After this is done the facts are studied by the staff of the Division of Hygiene in conjunction with the State District Health Officers and certain recommendations are formulated. It is then the duty of the nurse responsible

for that particular community to discuss the matter with the proper authorities, both public and private, and to see what can be done in the way of assisting them to improve the work under way or to inaugurate new activities. This, it may be understood, involves persuasion only, since the Department of Public Health has no authority nor any desire to enforce its recommendations. Its purpose is merely to give the communities the benefit of its study and best judgment as to the needs of the case.

During the past year we have surveyed 21 cities and 235 towns. It goes without saying that in conjunction with such a large amount of survey work the nurses have been unable to get far with the second phase of their job, namely, the promotion of new activities. This second phase is now being concentrated upon and will be for the coming year.

One cannot turn from the question of maternal and child hygiene without referring to certain allied activities which have been undertaken by the Division during the past year. A very important series of conferences was held in different sections of the State for local nurses engaged in maternal or child hygiene work. These were well attended and apparently produced results which justify us in repeating these conferences another year in a modified form.

Another important enterprise started was a breast-feeding campaign or "Babies' Rights" campaign, as it was called. Through it we planned to reach all the doctors and public health nurses of the State and a large section of the public. It is estimated that contact was made with approximately 150,000 people. Various kinds of publicity were used, including newspaper articles, pamphlets for physicians and nurses, and also popularly written pamphlets for distribution to the public. Boards of health and visiting nursing associations cooperated, as well as department stores, in trying to bring home to the mothers of young babies the fact that many lives could be saved and the health of many babies safeguarded by the use of breast-feeding.

PRE-SCHOOL AND SCHOOL HYGIENE.

During the first part of the year, we had one physician devoting practically her whole time to the promotion of school hygiene. During the last 7 months of the year, she had with her one of our nurses who has had special training and experience in this field.

The most valuable phase of the activities of these two workers has been their contact with school physicians and school nurses in the different municipalities of the State. Especial attention has been given to towns which have not yet, for one reason or another, complied with the School Nursing Law. The problems of these towns have been taken up with school superintendents and an effort has been made to assist these officials to make school medical inspection possible and effective. At the present time, there are only 30 out of the 355 cities and towns in the State which are not attempting school nursing service. Many of these towns are very small. Several of them have been exempted under the provisions of the School Nursing Law.

An important step in raising the standard of the medical supervision of the school child has been the putting into general use of the record card prescribed under the law for all the public schools in the State. This card was prepared by the Departments of Education and of Public Health jointly. Through the use of this card, we shall have not only a uniform method of recording but also a means of standardizing the type of medical examination given to the school child under the statutes.

Our school hygiene conferences for school physicians, nurses, superintendents and others have been continued this year and have served the purpose of raising still further the standard of school hygiene. This year a special conference was held for school physicians only, at the end of the general conference. These conferences as heretofore have been conducted jointly by the Department of Public Health and the Department of Education.

An outline on hygiene and health education for use in normal schools was prepared this year by the Department of Public Health and submitted to the Department of Education which now has it under consideration.

The pre-school child is not yet reached in a satisfactory manner. There is

existing machinery for reaching the child of school age and a more or less adequate opportunity to reach the baby. No satisfactory way, however, has been developed for extending these two types of activities backward and forward in such a way as to include the group which lies in between, namely the child of pre-school age. Greater effort undoubtedly should be made to keep under more extended observation the young child so as to carry him through this neglected period. In large cities especially, this can be done to a considerable extent through clinics. In smaller places nothing short of education of the public to the need of medical supervision of children of this age will accomplish the purpose. The Division of Hygiene hopes during the coming year to find methods of stimulating such activities throughout the State.

NUTRITION.

As in previous years, the chief function of our nutritionists has been to keep in contact with the work which is being done in different municipalities with a view to assisting and stimulating such activity. In addition to this, a number of other lines of work have been started. A special course in nutrition was prepared for school nurses. Although merely a beginning was made on this, it is hoped to extend it during the coming year. Furthermore, our nutritionists participated in our State-wide course for maternal and infant hygiene nurses; also in our conferences for school nurses. During June and July our senior nutritionist gave a course of seven lectures and conducted six periods of laboratory work for the nurses in training at the Department's Tuberculosis Sanatorium at Rutland.

A new feature of our nutrition work this past year has been the share which we have taken in the Tuberculosis Examination Clinics conducted under the auspices of the Division of Tuberculosis. Our nutritionists have by this means reached the school children, 10 per cent or more underweight, and their mothers who attend these clinics, discussing with them problems of diet and teaching them the importance of health habits. The Division expects to extend very considerably this piece of coöperation with the Division of Tuberculosis.

MOUTH HYGIENE.

Our activities along this line have followed the direction of last year's. Our mouth hygienist has been available for advice and assistance to those carrying on such work in different communities of the State. She has shared in the other projects of the Division already mentioned, such as school hygiene and maternal and infant hygiene conferences. Considerable time has also been put in by the hygienist on strengthening our mouth hygiene exhibit.

HEALTH EDUCATION.

This constitutes our oldest activity and also the one in which there is the greatest hope for extension in the future. Through health education of the public we are trying to bring to the average citizen the facts underlying hygienic activity which have been developed through the work of the various scientific specialists. Through health education we also hope so to inculcate into children a respect for their own health and an interest in promoting it that the next generation will be one to whom it will seem as simple to care for their health as it seems complicated to the present generation.

The first way in which we tried to reach the public with health information was through the use of Health Days and Health Weeks and exhibits of one sort or another. This method we are still using with success. We have learned by experience, however, that it is not the formal, rather expensive exhibit which makes the greatest impression upon the average individual. Our exhibits now are much more simple and flexible; more in number and less expensive in character. Our exhibit material is now constantly in use throughout the State. Our moving pictures on health are constantly being called for.

It is recognized, however, that we cannot stop here if we are to reach the average individual. A time-honored method for obtaining such contact has been the use of printed material in the shape of pamphlets and bulletins. These have their proper place. The old-time pamphlet, however, and bulletin were as a rule written in such technical language as to be more or less unintelligible to the average layman. We are now trying to make our material so simple yet accurate that the

ordinary intelligent layman may be sufficiently interested to read it and able to get the facts contained therein.

Lastly, there is one factor in health education which is probably greater than all the others and one which has never been sufficiently utilized. This is the newspaper. The newspapers of large cities have been recognizing this of late, and we see daily columns conducted by well-known health authorities dealing with the simple facts of hygiene; but after all, comparatively little has yet been done to make full use of this medium. The Division of Hygiene is trying now to develop a method for reaching the public through the newspaper. It has inaugurated a weekly service for the weekly newspapers and expects to extend this service. Very brief articles couched in as simple and interesting language as possible have been used. In this way the whole field of hygiene can in time be brought under the eye of many thousands of the citizens of the State.

MISCELLANEOUS ACTIVITIES.

Other activities which come within the scope of the program of the Division of Hygiene are the prevention of cancer and that other large body of non-communicable diseases which are to a greater or less extent preventable. Nothing new has recently developed in the way of prevention of cancer. Consequently the Division has endeavored to spread still further such knowledge about this disease as we have, stressing the importance of early diagnosis and treatment and has continued its free diagnostic service through cooperation with the Harvard Cancer Commission.

An old subject which has been brought into unusual prominence this year is that of periodic health examination. A number of people have for years appreciated the importance of having an annual or semi-annual examination by a competent medical man in order to get an appraisal of their physical condition and advice as to how to improve it or to keep it in a satisfactory condition. This year the National Health Council has inaugurated a nation-wide movement looking to a great increase in this type of service. There is involved, however, a considerable problem in educating the average individual to an appreciation of the need of such an annual overhauling. The practising physician too must be brought to see that such a type of service is needed and is even more worth while than the care of people actually sick. It is proposed to carry on a persistent informational campaign on this subject which, although slow like all educational measures, will be as certain as all properly carried out educational procedures are.

Report of the Division of Tuberculosis

Sumner H. Remick, M.D., *Director*.

The work of the Division of Tuberculosis during the past year has been directed along lines which would develop the various functions of the Division, which have proved, by experience, to offer the greatest possibilities in the ultimate control of tuberculosis; thereby offering the greatest amount of service to the citizens of the Commonwealth.

Besides the regular routine of the Division, increased efforts have been made to secure complete and accurate information on all reported cases and all ex-sanatoria patients. The examination of underweight school children has been extended to all sections of the State, and as a result 5,138 children have been examined. The position of Supervisor of Nurses was created within the Division during the year, being the first step toward developing a nursing service.

SANATORIA.

The four State Sanatoria, Rutland, Westfield, North Reading and Lakeville, have provided 375,053 days of treatment for 2,300 patients, with an average residence of 279 days. The weekly per capita cost is as follows: Rutland, \$16.03; Westfield, \$14.97; North Reading, \$15.09; Lakeville, \$17.62.

With the exception of about twenty beds for men at Lakeville, the sanatoria have been utilized to capacity. Seventy-eight names are on the waiting list.

The reports of the superintendents show an unusually satisfactory year from both medical and administrative angles. These reports give the results of treatment, and it is only necessary to note here the fact that the medical treatment is practically uniform in the four institutions, and that all proven methods of sanatorium treatment are strictly carried out. It may be of interest to mention that we are insisting upon rest to a much greater degree than in previous years, and with very gratifying results. Artificial pneumothorax has been used in a small group of selected cases with good result. Tuberculin has not been used as a therapeutic measure.

As noted in my report of last year, there continues to be an increasing number of admissions of the advanced type of case. This condition cannot be satisfactorily remedied until certain counties in some way provide for the care of their advanced cases, as required by the County Hospital Act of 1916, or until many cities now maintaining tuberculosis hospitals appreciate the need of maintaining their institutions on a level with the State and county institutions. It is earnestly hoped that as a result of the Special Report of the Committee on State Administration, and the Department's recommendations to the Legislature of 1923, the tuberculosis situation in regard to hospitalization by State, counties and cities may be definitely settled.

Both at Westfield and North Reading a physician has been added to the staff. As soon as housing facilities are provided, I shall recommend the addition of one physician at each of the other sanatoria.

The outstanding feature of the sanatoria farm activities has been the eradication of tuberculosis from the dairy herds. Rutland and Lakeville have, for some years, been carrying out the Bang method. During the year the Rutland herd has passed its third clean test, and has been accredited by the Government. The herd at Lakeville has successfully past two tests, and will be accredited within six months provided the third test shows no reactors. The herd at Westfield was so badly infected that the entire herd was slaughtered, and has been replaced with cows from accredited herds.

TUBERCULOSIS DISPENSARIES.

The Tuberculosis Dispensaries continue to be the most important agency in the State for the diagnosis and supervision of cases. During the past year 17,203 patients were examined. Boards of health in most instances have shown a very fine spirit of cooperation with the State Department, and have readily furnished all information required by the Division.

Although the dispensary situation as a whole has improved, it is necessary to note that many now maintained in small communities are not satisfactory; that is, few patients report for examination and advice. This is not necessarily the fault of the Board of Health or the dispensary staff, but may be due to the size and character of the town.

The law, which now requires all towns and cities of 10,000 population or over to maintain dispensaries, should be changed to require only towns and cities having a population of 50,000 or over to maintain a tuberculosis dispensary; and towns and cities under 50,000 population "may and shall at the request of the Department." This would allow the Department to determine where dispensaries ought to be maintained in the smaller communities. Closer and more helpful supervision of the work is desirable; uniform standards must be maintained. The Division through cooperation with the local boards of health should stimulate the local work through conferences for physicians and nurses.

CONSULTATION CLINICS.

The Consultation Clinics established by the Department in 1920 are now recognized by the practising physician as an important aid to them in the diagnosis of early pulmonary tuberculosis. These clinics are conducted by members of the staff of the four State sanatoria, and are held once a month in 17 cities. Patients may be referred by their family physician for examination either to these clinics or directly to the sanatoria. This service is free, and a written report is sent to the family physician with result of the examination.

Although 24 regular clinics had to be omitted last winter owing to travel conditions, 1,198 patients were referred for examination by 123 physicians. This is convincing evidence that the service is appreciated by the physicians. We intend to make such clinics available in every part of the State as rapidly as possible.

CHILDREN'S CLINICS.

For the past three years the Department, through its field force of physicians and nurses and the staff of the four sanatoria, has been conducting clinics in various towns and cities for the examination of selected groups of school children.

The work has been of an experimental nature and along lines suggested by Dr. Henry D. Chadwick, Superintendent of the Westfield State Sanatorium. During the past year 120 clinics have been held in 89 towns and cities where 5,138 children have been examined. The results of the examination of nearly 8,000 underweight children, during the past three years, indicate that 1 to 2/10ths of 1 per cent have adult pulmonary tuberculosis, about 8 per cent show definite signs of hilum tuberculosis, about 27 per cent were classified as suspicious and need very careful supervision; from 10 to 20 per cent were found to have other pathological conditions, the most common of which were carious teeth, enlarged tonsils, adenoids, bronchitis, goitre and organic heart disease. In the remaining group no definite sign of disease was found. In most instances this underweight was attributed to malnutrition.

You may ask "do we examine all the children in a school?" Of course, that would be the ideal method, but under present conditions it is not possible or practicable. From our investigations we have decided that three groups in a school ought to be examined. First group: all children 10 per cent or more underweight. Second group: all "contacts" or the children who have been exposed to tuberculosis in the home. Third group: a small group whose physical condition is considered unsatisfactory by the school or family physician.

Additional funds for the extension of this service have been requested in the 1924 budget, and a definite ten-year program has been planned which is presented in detail in the Commissioner's annual report.

NURSES.

As previously mentioned the position of Supervisor of Nurses was authorized during the year. Miss Cecilia A. Lemner, for many years with the Department and recently with the Division of Hygiene as Supervisor of Nurses, was appointed and assumed her new duties in June. Miss Lemner has made a very thorough study of our records and filing methods with special reference to the number of reported cases on file with the number that we have actually under supervision.

She has also recently started a survey of the work of the tuberculosis dispensaries.

On December first, 8 nursing assistants of the Division of Communicable Diseases will be transferred to this Division, thus bringing all the tuberculosis activities of the Department of Public Health directly under the Division of Tuberculosis. This, I am sure, will prove to be an important factor in the development of the work of the Division.

FOLLOW-UP WORK.

Complete and accurate information on all known cases of tuberculosis has long been recognized as of the utmost importance. The Divisional activities along these lines for various reasons have not been entirely satisfactory, but with the reorganization which has placed all tuberculosis activities of the Department of Public Health under the direction of the Division of Tuberculosis, I feel very optimistic for the future. A recent survey of our records showed that we have reports with more or less follow-up information on 31,985 cases of tuberculosis in the State of Massachusetts. We have complete initial histories on 13,136 cases and up-to-date follow-up reports on 9,415 of the above 13,136.

The Field Nurses of the Division are now giving practically their entire time to this phase of our work. Within the next 6 months we expect to have initial histories, and all necessary information on the 31,985 known cases of tuberculosis.

MEDICAL MEETINGS.

The twenty-fifth anniversary of the opening of the Rutland State Sanatorium was fittingly observed at the Sanatorium on Sept. 13, 1923. Among the 450 guests were State officials, members of the New England Tuberculosis Conference, and former members of the Board of Trustees.

Medical societies have held meetings at all of the sanatoria during the year. At Westfield, North Reading and Lakeville combined District Medical Society meetings have been held. Clinical demonstrations by members of the staff have been conducted at Rutland, Westfield and North Reading. In August, at the invitation of the Department, 14 physicians spent three days at Westfield studying methods of diagnosis of juvenile tuberculosis. This course was conducted very successfully by Dr. Henry D. Chadwick, the Superintendent, and the members of his staff.

During 1924, the Department hopes to be able to invite dispensary, school physicians and general practitioners to attend similar conferences

SUBSIDY.

The law provides that under certain conditions cities and towns providing hospital care for cases of pulmonary tuberculosis in approved hospitals are to be reimbursed by the Commonwealth at the rate of \$5.00 per week for each patient. For the year ending Nov. 30, 1923, this Division has received 2,200 claims for subsidy from 111 cities and towns. Of this number 1,737 claims, amounting to \$160,833.60, were allowed.

The death rate for pulmonary tuberculosis in Massachusetts for 1922 was 80.5 per 100,000 and will probably be somewhat lower this year. With the constantly decreasing number of deaths, we find that the State has a surplus of beds for the care and treatment of pulmonary tuberculosis. I feel that the time has come for the Commonwealth to provide care for sufferers from extra pulmonary tuberculosis. I would recommend that the Lakeville State Sanatorium be remodeled and equipped for this purpose. It is earnestly hoped that the acute situation that has developed in the past few years relative to the hospitalization of patients in state, county and municipal institutions may be satisfactorily solved by the present Legislature. With this difficult situation permanently settled, the future is full of promise for the whole tuberculosis problem.

The Commonwealth has provided adequate facilities for hospital and sanatorium treatment; dispensaries and clinics for diagnosis and supervision; a complete system of field and follow-up work has been worked out; the importance of juvenile tuberculosis has been recognized and examination of all underweight school children throughout the State is being carried on. With this definite program, Massachusetts will continue a leader in the great crusade against tuberculosis.

LAKEVILLE STATE SANATORIUM.

RESIDENT OFFICERS.

SUMNER COOLIDGE, M.D., *Superintendent.*MINOT W. GALE, M.D., *Assistant Superintendent.*EDMUND S. BURWELL, M.D., *Assistant Physician.*WILLIAM B. DAVIDSON, M.D., *Consulting Roentgenologist.*MRS. MARY M. COAKLEY, *Steward.*KATHERINE KEYES, *Head Matron.*ROBERT A. KENNEDY, *Chief Engineer.*THOMAS FRANCIS MAHONY, *Head Farmer.*

REPORT OF THE SUPERINTENDENT.

TO EUGENE R. KELLEY, M.D., *Commissioner, Department of Public Health:*

I have the honor to submit the fourteenth annual report of the Lakeville State Sanatorium for the year ending Nov. 30, 1923.

During the year there has been expended \$202,193.90 for maintenance, a gross weekly per capita of \$17.6294, and \$20,324.73 from the appropriation authorized by Chapters 126 and 494, Acts of 1923.

There has been collected from miscellaneous sources \$31,152.43 (the total of all collections). Deducting this amount from the gross maintenance expense leaves a net expense of \$171,041.47, and a net weekly per capita cost of \$14.9127.

There has been collected from private funds \$3,084.18; from cities and towns, \$26,698.42.

Fifty-four cases were supported wholly or in part from private funds: 293 by cities and towns; 177 wholly by the State; 3 by the United States Veterans' Bureau.

There were 209 patients in the sanatorium at the beginning of the year and 227 at the close. The largest number present at one time was 239, and the smallest was 198. The daily average number of patients was 220.5643. There were 352 cases admitted during the year; 20 minimal; 188 moderately advanced, 117 advanced, 25 not classified, and 2 not examined. There were 226 cases admitted from cities and towns over 25,000 population, and 126 from cities and towns under 25,000 population. The average age of patients admitted was 33 years. Including deaths there were 334 discharged, and the average duration of residence was 7 months 5 days. Of those discharged 162 gained 2,281 $\frac{3}{4}$ pounds, an average gain of 14 $\frac{1}{4}$ pounds per person. Of the discharges there were 3 apparently arrested cases, 1 more than last year; 16 quiescent, 2 less than last year; 132 improved, and 58 unimproved. There were 36 patients not considered, the duration of treatment being less than one month. There were 88 deaths, 5 more than last year. There was 1 discharged non-tubercular. There were 80,506 hospital days of treatment, 8,240 less than last year.

Our inability to keep the wards filled to capacity which has resulted in an unusually low average number of patients for the year has caused a correspondingly higher per capita cost. The women's ward has been almost filled to capacity during the year but there have been continuously many vacant beds on the men's side.

The following table shows the classification on the application blank and our classification on admission:

	Classification on Application Blank.	Our Classification on Admission.
Minimal	45	20
Mod. Adv.	227	188
Advanced	67	117
Unclassified	13	25
Not examined	—	2
	352	352

MEDICAL REPORT.

Dr. Harry Silbert, who was appointed to the position of Assistant Physician on Oct. 3, 1922, resigned on Sept. 14, 1923, and on Oct. 4, 1923, Dr. Edmund S. Burwell, Harvard Medical School, 1920, was appointed to fill the vacancy. Dr. Burwell brings to the sanatorium an experience of two years in the tuberculosis work of the Veterans' Bureau.

The dental work of patients has been done by arrangement with the Middleboro dentists at their offices or by granting leaves of absence to patients so that their dentists at home might do the work.

The X-ray examination of patients has become a part of our routine and is proving most helpful in checking up physical examinations of doubtful cases, especially of those cases referred to the sanatorium by outside physicians. The routine examination of sputum and urines has been continued.

CLINICS.

Consultation clinics have been held monthly at Fall River, Taunton, Brockton and Plymouth.

Fall River	.	.	.	.	.	.	.	.	.	.	.	0
Taunton	.	.	.	.	.	.	.	.	.	.	.	15
Brockton	.	.	.	.	.	.	.	.	.	.	.	4
Plymouth	.	.	.	.	.	.	.	.	.	.	.	10
												<hr/> 29

Clinics for the examination of underweight school children have been held in Swansea, Somerset, Dighton, Seekonk, Mansfield, Foxboro, Walpole, Norfolk, Attleboro, Randolph, Holbrook, Cohasset, Fairhaven and Acushnet. The total number of children examined was 960. Of the children examined at the above clinics 17 have been brought to the sanatorium for X-ray examination, all of whom showed evidence of tuberculous infection.

During the summer 180 examinations were made of boy scouts who were encamped in the neighborhood of the sanatorium. Of these 19 were considered suspicious cases. It was not possible to make an X-ray examination of all the suspicious cases but of 8 cases thus examined 6 showed evidence of tubercular infection.

FARM.

The farm showed a good average production for the year, the quantities of miscellaneous products produced and canned being greater than ever before.

The principal items were: eggs, 10,648¼ dozens; milk, 179,125½ quarts; poultry, 9,152 pounds; pork, 23,857 pounds.

The tuberculosis-free herd of dairy cattle has grown to number 68, nearly all of which have passed two successful tests. The milk production for the year has fallen a little below that of previous years because of the steady elimination of the reactors which were mature cows and heavy producers, leaving the burden of production upon young cows in the first part of lactation.

An epidemic of hemorrhagic septicemia decreased the herd of swine to a considerable extent so that the production of pork is not quite equal to that of previous years.

IMPROVEMENTS.

The work on increasing the water supply of the sanatorium was begun so late in the year that it could not possibly be completed. The search for additional supply of ground water proving unsuccessful an investigation was made of a possible water supply from a pond four-fifths of a mile from the sanatorium. As the investigation was not completed at the end of the year no additional supply has yet been provided.

The erection of a 50,000-gallon steel tank for additional storage and improved fire protection was approaching completion at the end of the year.

Considerable underground work has been done in connecting the new tank with the old system of piping and preparations have been made for taking water from the new 6-inch main to the buildings and to several additional fire hydrants.

The system of absorption trench for the disposal of sewage has been extended and a portion of the 2-inch high-pressure steam line extending from the power plant to the wards and administration building has been replaced by a 2½-inch pipe.

RECOMMENDATIONS.

The most urgent need of the institution at the present time is a building for male employees, which would enable us to remove male employees from the ward buildings. To house male employees in such proximity to patients, especially on the women's side, is wrong, and provisions should be made for their removal to quarters

entirely apart from the buildings occupied by patients. The completion of this building will make possible an improvement in the housing of female employees and provide suitable family quarters for the medical staff.

I wish again to urge the importance of providing homes for certain permanent employees with families. I recommend the purchase of several houses in the immediate neighborhood of the institution which are now available.

ACKNOWLEDGMENTS.

The past year has been marked by the most pleasant cooperation on the part of the Catholic, Protestant, and Jewish clergymen who have served as chaplains during the year, and it is gratifying to be able to express appreciation of the faithful services of the medical staff and the heads of departments, some of whom have been with the institution since the first year of its existence.

Gifts of books and magazines, and entertainments by outsiders interested in the welfare of the patients, are gratefully acknowledged.

Respectfully submitted,

SUMNER COOLIDGE, *Superintendent.*

REAL ESTATE, 1923.

Grounds, 50 acres		\$9,789.17	
Lawns and buildings, 48 acres.			
Roads, 2 acres.			
Woodland, 10 acres		535.70	
Mowing, 47 acres		2,250.37	
Tillage, 49 acres		4,311.51	
Tillage, 30 acres.			
Garden, 19 acres.			
Orchard, 8 acres		611.65	
Pasture, 13 acres		696.41	
Waste and miscellaneous, 32 acres		1,542.27	
Rough pasture, 20 acres.			
Meadow swamp land, 11 acres.			
Sewer beds.			
New coal trestle, 1 acre.			
		<hr/>	
Sewage system		\$19,737.08	
		4,882.00	
		<hr/>	
Total			\$24,619.08

Buildings.

Institution buildings		\$140,089.03	
Farm, stable and grounds		34,142.87	
Miscellaneous		89,795.10	264,027.00
		<hr/>	
			\$288,646.08
Present value of all personal property as per inventory of Dec. 1, 1923			99,599.12
			<hr/>
Grand total			\$388,245.20

POPULATION.

	Males.	Females.	Total.
Number received during the year	250	102	352
Number passing out during the year	228	106	334
Number at end of fiscal year in the institution	157	70	227
Daily average attendance (number of inmates actually present during the year)	147	73	220
Average number of employees and officers during the year			110

EXPENDITURES.

Current expenditures:			
1. Salaries and wages		\$94,961.70	
2. Clothing		—	
3. Subsistence		26,999.71	
4. Ordinary expenses		6,947.71	
5. Office, domestic and outdoor expenses		73,284.78	\$202,193.90
		<hr/>	
Extraordinary expenses:			
1. Permanent improvements			11,115.63
Water supply and fire protection.			
			<hr/>
Grand total			\$213,309.53

Summary of Current Expenses:

Total expenditures	\$213,309.53	
Deduction of extraordinary expenses	11,115.63	\$202,193.90
	<hr/>	
Deducting amount of sales		1,187.92
		<hr/>
		\$201,005.98

Dividing this amount by the daily average number of patients, 220.56, gives a cost for the year of \$911.34, equivalent to an average weekly net cost of \$17.53.

TABLE 1. — *Admissions and Discharges.*

	Males.	Females.	Total.
Number of patients admitted Dec. 1, 1922, to Nov. 30, 1923, inclusive	250	102	352
Number of patients discharged Dec. 1, 1922, to Nov. 30, 1923, inclusive	228	106	334
Number of deaths (included in preceding item)	58	30	88
Number remaining in Sanatorium Nov. 30, 1923	157	70	227
Daily average number of bed patients Dec. 1, 1922, to Nov. 30, 1923	56	44	100
Daily average number of patients	147	73	220

TABLE 2. — *Civil Condition of Patients Admitted.*

	Males.	Females.	Totals.
Married	128	45	173
Single	115	47	162
Widowed	4	9	13
Divorced	3	1	4
Totals	250	102	352

TABLE 3. — *Ages of Patients Admitted.*

	Males.	Females.	Totals.
14 to 20 years	21	15	36
20 to 30 years	81	49	130
30 to 40 years	66	20	86
40 to 50 years	52	11	63
Over 50 years	30	7	37
Totals	250	102	352

Average age, 33 years.

TABLE 4. — *Nativity and Parentage of Patients Admitted.*

PLACES OF NATIVITY.	MALES.			FEMALES.			TOTALS.		
	Patient	Father	Mother	Patient	Father	Mother	Patient	Father	Mother
United States:									
Massachusetts	82	18	16	39	9	7	121	27	23
Other N. E. States	17	13	9	8	8	6	25	21	15
Other States	10	9	9	3	3	5	13	12	14
	109	40	34	50	20	18	159	60	52
Other Countries:									
Unknown	0	5	6	0	2	3	0	7	9
Albania	2	2	2	2	2	2	4	4	4
Armenia	3	3	3	1	1	1	4	4	4
Austria	0	0	0	0	1	1	0	1	1
Azores	0	0	0	0	1	1	0	1	1
Baltic	1	1	1	0	0	0	1	1	1
Canada	11	17	18	8	14	16	19	31	34
China	1	0	1	0	0	0	1	0	1
Cape Verde Is.	0	0	0	2	2	2	2	2	2
Denmark	0	0	0	1	1	1	1	1	1
England	7	10	9	4	7	6	11	17	15
Finland	3	4	3	2	2	2	5	6	5
France	1	2	2	1	1	1	2	3	3
Germany	2	4	3	2	3	2	4	7	5
Greece	6	6	6	0	1	1	6	7	7
Italy	23	28	28	8	10	10	31	38	38
Ireland	19	52	54	2	10	13	21	62	67
India	0	0	0	0	1	0	0	1	0
Lithuania	1	1	1	1	1	1	2	2	2
New Brunswick	1	2	3	0	1	1	1	3	4
Newfoundland	2	2	3	0	0	0	2	2	3
Nova Scotia	7	9	10	5	5	6	12	14	16
Norway	0	2	1	0	0	0	0	2	1
Poland	12	16	16	0	0	0	12	16	16
P. E. Island	2	1	2	2	2	0	4	3	2
Portugal	8	8	8	1	1	1	9	9	9
Russia	20	19	20	6	7	7	26	26	27
So. America	0	0	0	0	1	0	0	1	0
Scotland	1	4	3	3	3	4	4	7	7
Sweden	5	7	7	1	2	2	6	9	9
Spain	1	1	1	0	0	0	1	1	1
Syria	1	2	2	0	0	0	1	2	2
Turkey	1	2	2	0	0	0	1	2	2
Wales	0	0	1	0	0	0	0	0	1
Totals	250	250	250	102	102	102	352	352	352

Patients native born, 45.1704 per cent; patients foreign born, 54.8295 per cent.

TABLE 5.— *Residence of Patient Admitted.*

Adams, 4	Leominster, 1	Quincy, 10
Amherst, 1	Lexington, 1	Raynham, 2
Auburndale, 1	Linden, 1	Revere, 3
Arlington, 1	Lowell, 1	Rutland, 1
Attleboro, 1	Lynn, 4	Sharon, 2
Bellingham, 1	Malden, 10	Saugus, 2
Boston, 101	Madison, Me., 1	Somerville, 15
Bridgewater, 1	Mansfield, 1	Spencer, 1
Brockton, 1	Marlboro, 2	Springfield, 9
Brookfield (West), 1	Medfield, 1	Sterling, 1
Cambridge, 6	Medford, 4	Stoneham, 3
Cangamond Lake, 1	Melrose, 2	Taunton, 1
Canton, 3	Middleboro, 4	Wakefield, 3
Charlestown, 4	Mills, 1	Waltham, 11
Chelsea, 15	Mt. Hermon, 1	Watertown, 1
Chicopee, 1	Natick, 1	Waverley, 2
Chicopee Falls, 2	Needham, 2	Westfield, 5
Clinton, 2	New Bedford, 7	Wheelwright, 1
Concord Jct., 1	Newton, 7	Whitinsville, 2
Easthampton, 1	Newtonville, 1	Winthrop, 3
Edgeworth, R. I., 1	Newburyport, 1	Winchendon, 1
Everett, 6	Northampton, 1	Winchester, 1
Fall River, 35	Oak Bluffs, 1	Woburn, 4
Feeding Hills, 1	Oxford, 1	Worcester, 4
Fitchburg, 1	Palmer, 1	Wrentham, 1
Framingham, 2	Peabody, 1	No. Pownal, Vt., 1
Gilbertville, 2	Pittsfield, 2	Stoughton, 1
Greenfield, 1	Portland, Me., 1	Total, 352.
Haverhill, 1		

TABLE 6. — *Occupation.*

	Males.	Fe- males.	Totals.		Males.	Fe- males.	Totals.
Accountant	1	—	1	Marble cutter	1	—	1
Accountant (public)	1	—	1	Marine engineer	1	—	1
Air brake repairer	1	—	1	Merchant	1	—	1
Ammunition factory	—	1	1	Metal factory	1	—	1
Armature winder	1	—	1	Milliner	—	1	1
Attendant	2	1	3	Mill hand	2	1	3
At home	—	3	3	Miner (coal)	1	—	1
Auto repairer	2	—	2	Motorman	1	—	1
Baker	1	—	1	Mule spinner	1	—	1
Banker	1	—	1	Musician	1	—	1
Barber	2	—	2	Nightwatchman	2	—	2
Blast operator	1	—	1	Nurse	—	3	3
Bookkeeper	1	—	1	Nursemaid	—	5	5
Boss boy (hotel)	1	—	1	Office worker	—	2	2
Boxmaker	1	1	2	Overall cutter	1	—	1
Brakeman	1	—	1	Painter	9	—	9
Brush maker	1	—	1	Peddler	1	—	1
Bricklayer	1	—	1	Pharmacist (registered) ..	1	—	1
Bus boy	1	—	1	Photo engraver	1	—	1
Butler	1	—	1	Piano polisher	1	—	1
Carpenter	9	—	9	Plumber	3	—	3
Carriage factory	1	—	1	Policeman	1	—	1
Chauffeur	6	—	6	Plasterer	1	—	1
Checker (textile)	1	1	2	Press worker	2	—	2
Chef	—	—	1	Printer	3	—	3
Chocolate	1	1	1	Radio clerk	1	—	1
Civil engineer	1	—	1	Reed worker	1	—	1
Cleaner and dyer	2	—	2	Restaurant worker	1	—	1
Clerk	8	—	8	Roller cover shop	1	—	1
Conductor	2	—	2	Rofer	1	—	1
Construction work	1	—	1	Rubber worker	3	1	4
Cook	4	1	5	Saleslady	—	4	4
Cotton mill	4	3	7	Salesman	6	—	6
Counterman	1	—	1	Schoolteacher	—	1	1
Creamery	1	—	1	Screen maker	1	—	1
Dental mechanic	1	—	1	Shipyards	1	—	1
Dietitian	—	1	1	Shoe factory	8	1	9
Doctor	1	—	1	Shoemaker	1	—	1
Dressmaker	—	3	3	Shoe shipper	1	—	1
Elevator starter	1	—	1	Speeder tender	2	—	2
Electrician	1	—	1	Spinner	1	—	1
Electric motor assembler ..	1	—	1	Steam fitter	1	—	1
Enamel factory	1	—	1	Steel factory	1	—	1
Farmer	6	—	6	Stenographer	—	3	3
Florist	2	—	2	Stone cutter	1	—	1
Foreman (electric plant) ..	1	—	1	Stone mason	1	—	1
Foundry	1	—	1	Stove factory	—	1	1
Gardener (landscape)	1	—	1	Student	4	3	7
Gardener	2	—	2	Sweater factory	1	—	1
Grocery clerk	3	—	3	Tag factory	1	—	1
Housekeeper	—	15	15	Tailor	7	—	7
Housewife	—	35	35	Tailoress	—	2	2
Ice man	1	—	1	Taxi business	1	—	1
Ironworker	2	—	2	Teamster	6	—	6
Janitor	3	—	3	Telegraph operator	—	2	2
Jewelry shop	1	—	1	Telephone distributor	1	—	1
Kitchenman	2	—	2	Telephone installer	1	—	1
Knitter (woolen mill)	—	1	1	Tire factory	1	—	1
Laborer	27	—	27	Tinsmith	3	—	3
Laboratory assistant	—	1	1	Trainman	1	—	1
Laboratory technician	1	—	1	Truck helper	1	—	1
Laundryman	2	—	2	Typewriter repairer	1	—	1
Leather factory	3	—	3	Waiter	2	—	2
Machinist	10	—	10	Watch factory	—	1	1
Manager, store	1	—	1	Weaver cotton mill	11	3	14
Manufacturing liquid ex- terminator	1	—	1		250	102	352

TABLE 7. — *Stage of Disease on Admission.*

	Males.	Females.	Totals.	Percentage.
Minimal	6	14	20	5.6818
Moderately advanced	123	65	188	53.4091
Advanced	96	21	117	33.2386
Not classified	23	2	25	7.1023
Non-TB	—	—	—	—
Not examined	2	—	2	.5682
* Totals	250	102	352	

TABLE 8. — *Condition on Discharge.*

	Males.	Females.	Totals.	Percentage.
Apparently arrested	1	2	3	.8982
Quiescent	7	9	16	4.7904
Improved	98	34	132	39.5209
Unimproved	33	25	58	17.3652
Died	58	30	88	26.3473
Non-pulmonary	—	1	1	.2994
Not considered	31	5	36	10.7785
Totals	228	106	334	

TABLE 9. — *Deaths.*

DURATION OF DISEASE.	Males.	Females.	Totals.	LENGTH OF RESIDENCE IN SANATORIUM.		
				Males.	Females.	Totals.
Under 1 month	—	—	—	10	—	10
1 to 2 months	—	—	—	5	4	9
2 to 3 months	3	—	3	8	1	9
4 to 5 months	—	1	1	8	4	12
5 to 6 months	1	1	2	6	2	8
6 to 7 months	2	2	4	2	1	3
7 to 8 months	1	2	3	2	2	4
8 to 9 months	1	—	1	1	—	1
9 to 10 months	3	—	3	2	3	5
10 to 11 months	—	—	—	—	—	—
11 to 12 months	5	4	9	—	3	3
12 to 13 months	6	1	7	7	1	8
13 to 14 months	—	—	—	—	—	—
15 to 16 months	2	1	3	2	4	6
Over 2 years	28	16	44	5	5	10
Unknown	6	2	8	—	—	—
Totals	58	30	88	58	30	88

TABLE 10. — *Cause of Death.*

	Males.	Females.	Totals.
Pulmonary tuberculosis	58	29	87
Suicide	—	1	1
Total	58	30	88

RUTLAND STATE SANATORIUM.

RESIDENT OFFICERS.

ERNEST B. EMERSON, M.D., *Superintendent.*
 LEON A. ALLEY, M.D., *Assistant Superintendent.*
 HALBERT C. HUBBARD, M.D., *Senior Assistant Physician.*
 MARK H. JORESS, M.D., *Assistant Physician.*
 MOSES J. STONE, M.D., *Assistant Physician.*
 Vacancy, *Assistant Physician.*
 WILLIAM B. DAVIDSON, M.D., *Consulting Roentgenologist.*
 WILLIAM J. O'CONNOR, D.M.D., *Dentist.*
 DELYA E. NARDI, *Superintendent of Nurses.*
 CORA A. PHILLIPS, *Head Matron.*
 OLIN C. BLAISDELL, *Steward.*
 WALTER C. BROWN, *Chief Engineer.*
 JOSEPH A. CARROLL, *Head Farmer.*

REPORT OF THE SUPERINTENDENT.

To EUGENE R. KELLEY, M.D., *Commissioner, Department of Public Health:*

I have the honor to submit the twenty-seventh annual report of the Rutland State Sanatorium for the year ending Nov. 30, 1923.

During the year there has been expended \$294,661.02 for maintenance, a gross weekly per capita cost of \$16.0362. There has been expended from the special appropriation authorized by Chapter 129, Resolves of 1922, \$17,825.89. The details of these disbursements are contained in the report of the treasurer.

There has been collected from miscellaneous sources (the total of all collections), \$84,236.16, a decrease of .1288 per cent from the collection of last year. Deducting this amount from the gross maintenance expense leaves a net expense of \$210,424.86, a net weekly per capita cost of \$11.4519, .1483 per cent more than last

year. There has been collected from private sources \$19,542.27, .4620 per cent increase over last year, and the largest collection since 1912; from cities and towns, \$44,430.45, a decrease of .0251 per cent over last year; from the United States Veterans' Bureau, \$16,006.17, a decrease of .5466 per cent from last year. Two hundred and six cases were supported wholly or in part from private funds; 236 by cities and towns; 46 wholly by the State; 7 by the United States Veterans' Bureau. There are 70 cases on which settlement has not been determined.

There were 347 patients in the sanatorium at the beginning of the year, 368 at the close. The largest number present at one time was 371, and the smallest 326. The daily average number of patients was 353.36. There were 538 cases admitted during the year; 111 incipient, 188 moderately advanced, 217 far advanced and 22 unclassified. There were 337 cases admitted from cities and towns of over 25,000 population, and 201 from cities and towns under 25,000 population. The average age of patients admitted was 29 years. Including deaths, there were 517 patients discharged, and the average duration of residence was 238 days, 63 $\frac{3}{4}$ days less than last year. Of those discharged 355 gained 4,439.75 pounds, an average gain of 12.51 pounds per person. Of the discharges there were 26 arrested cases, 13 more than last year; 28 apparently arrested, 9 more than last year; 255 quiescent, 42 more than last year; 58 improved, 49 unimproved, 2 no diagnosis made, and 34 not considered, the duration of treatment being less than one month. There were 58 deaths, the same number as last year. There were 7 discharged non-tuberculous. There were 128,978 hospital days of treatment, 690 less than last year.

The following table shows the classification on the application blank and our classification on admission:

	Classification on Application Blanks.	Our Classification on Admission.	Per Cent.
Incipient	289	111	20.62
Moderately advanced	214	188	34.95
Far advanced	21	217	40.34
Unclassified	14	22	4.09
Totals	538	538	

The 1922 admissions were classified as follows:

Incipient, 68 or 15.2 per cent.
 Moderately advanced, 136 or 30.4 per cent.
 Far advanced, 220 or 49.1 per cent.
 Unclassified, 24 or 5.3 per cent.

Dr. William B. Davidson resigned March 11, 1923, to enter private practice. He is now affiliated with the sanatorium as Consulting Roentgenologist.

Dr. James F. McLaughlin resigned Oct. 15, 1923, to enter private practice. Dr. McLaughlin rendered most efficient and conscientious service and his resignation is a loss to the Commonwealth and again calls attention to the salaries paid assistant physicians which fail to hold in the service of the State the type of man which makes for good work and progress. This vacancy has not been filled.

Dr. Moses J. Stone, a graduate of Tufts Medical School and of the Long Island Hospital, and more recently an assistant physician at the State Infirmity, was appointed to the position made vacant by the resignation of Dr. Davidson.

The following table is a summary of the dental work done during the year:

Examinations, 2,392	Treatments, 708	Repairs to plates, 12	
Mouth washes, 81	Surgical dressings, 8	Bridges, 41	
Prophylactics, 305	Extractions, 328	Plates, 14	
Amalgam fillings, 242	Abscess cases, 106	Crowns, 86	
Cement fillings, 168	Vincent's disease, 5	Repairs to bridges, 8	
Gutta percha fillings, 246	Inlays, 82	Bed treatments, 36	
Temporary fillings, 178			
Urine examinations, routine			806
Special (24-hour specimens)			34
Private sanatoria			18
Total			858
Sputum examinations for tuberculosis		Positive. Negative.	Total.
Sputum examinations for tuberculosis, private sanatoria		3,371 2,442	5,813
		31 8	39
Totals		3,402 2,450	5,852

	Doubtful.	Positive.	Negative.	Total.
Blood drawn for Wassermann test	5	17	420	442
Sputum examinations for pneumococcus				1
Sputum examination for influenza				1
Blood counts				28
Blood counts, private sanatoria				2
Total				30
Cultures from wounds				1
Cultures from feces				2
Occult blood examinations				7
Blood smears for malarial parasites				2
Smears examined for gonococcus				2
Guinea-pig inoculations				33
Babcock fat test on 24 samples of milk.				

Of 369 patients remaining in the sanatorium Nov. 30, 1923, 266 or 75.4 per cent are positive cases.

Classes in urine analysis and bacteriology conducted for the nurses in Training School.

X-RAY REPORT.

X-ray plates (chest), 717.

X-ray plates (teeth), 72.

Fluoroscopic examinations, 250.

The consultation clinics were held monthly at Worcester, Fitchburg, Clinton and Gardner and the following examinations were made:

Number of patients examined	175
Diagnosis:	
Tuberculosis	73
Non-tuberculous	26
Observation	75
No diagnosis	1
Total	175

34 ex-patients reported for follow-up examinations, making a total of 209 examinations.

Number of physicians referring cases	51
Number of patients examined once	157
Number of patients examined twice	17
Number of patients examined three times	1
Number of ex-patients examined once	26
Number of ex-patients examined twice	4
Number of ex-patients examined three times	3
Number of ex-patients examined four times	1

There were 14 cases admitted to the sanatorium following examinations at the clinics.

The following examinations have been made at the sanatorium:

Patients referred by outside physicians	54
Patients examined at own request	135
Total	189
Diagnosis:	
Tuberculosis	100
Non-tuberculous	49
Observation	40
Total	189

197 ex-patients reported to the sanatorium for follow-up examination.

Number of physicians referring cases	38
Number of patients examined once	31
Number of patients examined twice	18
Number of patients examined three times	3
Number of patients examined four times	2
Number of ex-patients examined once	163
Number of ex-patients examined twice	28
Number of ex-patients examined three times	6

There were 24 patients admitted to the sanatorium following examinations at the sanatorium.

Examinations of school children were made in Acton, Athol, Dracut, Grafton, Hudson, Milford, Northbridge, North Grafton, Orange, Princeton, Sterling and Templeton:

Total number of school children examined	376
Total number of adults examined at school clinics	56
Total	432

Diagnosis (school children):

Tuberculosis	12
Non-tuberculous	220
Observation	144
Total	376

Diagnosis (adults):

Tuberculosis	25
Non-tuberculous	11
Observation	20
Total	56

The total of all examinations made during the year exclusive of routine work was 1,027.

There are 38 nurses in training; 10 Probationers, 8 Intermediates, 12 Juniors and 8 Seniors.

The following have been awarded diplomas: Hazel Louise Bacher, Jane Frances Birmingham, Marion Agnes O'Connell, Mary Alice Hardy, Marion Azell Delaney, Bertha Marie Gibney, Florina Alice Auger, Esther Mae Madigan, John Francis Anderson.

On account of the difficulty of securing a competent poultryman the poultry plant has been abandoned and the stock sold. We are now purchasing our table eggs of the prison camp and hospital.

In the spring we lost about half of the swine from an epidemic of hemorrhagic septicemia.

The herd remains tuberculosis free.

The building for male employees authorized under Chapter 129, Acts 1922, was opened for occupancy early in the summer. The opening of this building again emphasizes, as noted in previous reports, the necessity of providing similar quarters for women employees now quartered in rooms and dormitories adjoining the wards.

A flat-work ironer and washing machine have been added to the laundry equipment.

One 256 horse-power Keeler horizontal tube boiler is now being installed.

I believe we have a great fire hazard inasmuch as none of the buildings are fire-proof, and are, for the most part, connected by corridors and subways. A fire once started on a windy night would in all probability wipe out the entire institution exposed as it is to the mercy of the elements. The thought of such a catastrophe, — the turning out at night of 500 people, over 200 of whom are bed patients, with shelter miles away, is appalling. I recommend a sprinkler system as a measure of protection against such a calamity on a stormy winter night.

My co-workers have rendered a year of faithful service and merit your approval.

Deeply appreciating your interest and confidence, I am,

Respectfully,

ERNEST B. EMERSON, *Superintendent.*

VALUATION.

Land.

Grounds, 48.197 acres	\$16,942.20	
Lawns and buildings, 38.197 acres.		
Roads, 10.00 acres.		
Woodland, 77.71 acres	2,683.65	
Mowing, 76.70 acres	7,725.50	
Tillage, 31.01 acres	3,321.00	
Tillage, 28.50 acres.		
Garden, 2.51 acres.		
Orchard, 6.75 acres	1,350.00	
Pasture, 35.62 acres	2,222.40	
Waste and miscellaneous, 88.74 acres		
Rough pasture, 64.04 acres.		
Meadow swamp, 18.22 acres.		
Sewer beds, 5.98 acres.	2,866.95	
New coal trestle, .50 acres.	15,508.32	
Sewerage system		
Total.		\$52,620.02

Buildings.

Institution buildings	\$543,166.94	
Farm, stable and grounds	26,475.00	
Miscellaneous	35,668.83	605,310.77
Total.		\$657,930.79
Present value of all personal property as per inventory of Dec. 1, 1923		84,919.86
Grand total		\$742,850.65

POPULATION.

	Males.	Females.	Totals.
Number received during the year	277	261	538
Number passing out of the institution during the year	266	251	517
Number at end of the fiscal year in the institution	189	179	368
Daily average attendance (number of inmates actually present during the year)	184.41	168.95	353.36
Average number of employees and officers during the year	118.919	67.977	186.896

EXPENDITURES.

Current expenditures:			
1. Salaries and wages	\$135,333.71		
2. Clothing	198.14		
3. Subsistence	74,810.46		
4. Ordinary repairs	9,395.30		
5. Office, domestic and outdoor expenses	74,923.41		
			\$294,661.02
Extraordinary expenses:			
1. Permanent improvements to existing buildings			17,825.89
Grand total			\$312,486.91

Summary of Current Expenses.

Total expenditure	\$312,486.91		
Deducting extraordinary expenses	17,825.89		
			\$294,661.02
Deducting amount of sales			3,295.01
			\$291,366.01

Dividing this amount by the daily average number of patients, 353.36, gives a cost for the year of \$824.55, equivalent to an average weekly net cost of \$15.8569.

STATISTICAL TABLES.

TABLE 1. — *Admissions and Discharges.*

	Males.	Females.	Totals.
Patients in Sanatorium Nov. 30, 1922.	178	169	347
Patients admitted Dec. 1, 1922, to Nov. 30, 1923.	277	261	538
Patients discharged Dec. 1, 1922, to Nov. 30, 1923.	266	251	517
Patients remaining in sanatorium Nov. 30, 1923.	189	179	368
Daily average number of patients	184.41	168.95	353.36
Deaths (included in number discharged)	32	26	58

TABLE 2. — *Civil Condition of Patients Admitted.*

	Males.	Females.	Totals.
Single	160	125	285
Married	110	125	235
Widowed	6	10	16
Divorced	1	1	2
	277	261	538

TABLE 3. — *Age of Patients Admitted.*

	Males.	Females.	Totals.	Percentage.
Under 14 years	—	—	—	—
14 to 20 years	41	31	72	13.38
20 to 30 years	110	126	236	43.89
30 to 40 years	82	82	164	30.48
40 to 50 years	31	17	48	8.92
Over 50 years	13	5	18	3.33
	277	261	538	—
Average age	30.49	28.57	29.56	—

TABLE 4. — *Nativity and Parentage of Patients Admitted.*

PLACES OF NATIVITY.	MALES.			FEMALES.			TOTALS.		
	Patients.	Fathers.	Mothers.	Patients.	Fathers.	Mothers.	Patients.	Fathers.	Mothers.
United States:									
Massachusetts	165	65	65	145	45	47	310	110	112
Other N. E. States	14	17	16	26	31	20	40	48	36
Other States	19	24	17	17	11	10	36	35	27
Total native	198	106	98	188	87	77	386	193	175
Other Countries (27):									
Total foreign	79	170	171	73	168	178	152	338	349
Unknown	—	1	8	—	6	6	—	7	14
Grand totals	277	277	277	261	261	261	538	538	538

TABLE 5. — *Residence of Patients Admitted.*

Adams, 3	Haverhill, 4	Paxton, 2
Amesbury, 1	Holden, 1	Pepperell, 1
Arlington, 2	Holyoke, 15	Pittsfield, 2
Athol, 1	Hopedale, 1	Quincy, 6
Attleboro, 2	Hubbardston, 1	Reading, 1
Avon, 1	Huntington, 1	Revere, 5
Baldwinsville, 1	Ipswich, 1	Rockland, 1
Belchertown, 1	Lawrence, 3	Russell, 1
Belmont, 5	Lee, 3	Rutland, 5
Berlin, 1	Leicester, 1	Salem, 4
Billerica, 1	Leominster, 10	Saxonville, 1
Blanford, 1	Leverett, 1	Sherborn, 1
Boston, 119	Linwood, 1	Smiths, 1
Boylston, 1	Longmeadow, 1	Somerville, 9
Bridgewater, 1	Lowell, 2	Southbridge, 2
Brockton, 3	Ludlow, 2	South Hadley, 2
Brookline, 4	Lyonsville, 1	Spencer, 4
Cambridge, 15	Lynn, 4	Springfield, 39
Carver, 1	Malden, 3	Stoughton, 1
Charlemont, 2	Mansfield, 1	Taunton, 1
Chelmsford, 2	Marlboro, 5	Three Rivers, 1
Chelsea, 10	Maynard, 1	Townsend, 1
Chicopee, 3	Medford, 3	Waltham, 4
Clinton, 2	Melrose, 2	Ware, 1
Colerain, 1	Middleboro, 1	Warwick, 1
Concord, 1	Milford, 3	Watertown, 8
Dedham, 1	Millbury, 1	Wayland, 1
Dudley, 1	Millers Falls, 1	Webster, 9
East Bridgewater, 1	Monson, 1	Westboro, 3
Easthampton, 1	Natick, 1	West Boylston, 1
East Saugus, 1	Needham, 1	Westfield, 3
Everett, 3	New Bedford, 5	Westminster, 1
Fall River, 9	Newburyport, 1	West Springfield, 6
Farley, 1	Newton, 7	Weymouth, 1
Fitchburg, 10	New York City, 1	Whitinsville, 2
Framingham, 3	North Adams, 5	Wilbraham, 2
Gardner, 18	North Brookfield, 1	Williamstown, 1
Gilbertville, 2	Norwood, 3	Winthrop, 4
Granby, 1	Orange, 3	Woburn, 4
Greenfield, 2	Otter River, 1	Worcester, 50
Harding, 1	Palmer, 1	Total, 538.

TABLE 6. — *Occupation of Cases Admitted.*

	Males.	Females.		Males.	Females.
Accountant	2	—	Machinist	13	—
Actor	1	—	Mail carrier	2	—
Adjuster	1	—	Mason	1	—
Agent, Insurance	2	—	Merchant	3	—
Agent, Purchasing	1	—	Merchant, Leather	1	—
Attendant	—	1	Metal worker	1	—
Baker	1	—	Meter maker	1	—
Baggagemaster	1	—	Messenger boy	1	—
Beaterman	1	—	Mill worker	13	12
Bell boy	1	—	Moulder	3	—
Blacksmith	1	—	No occupation	2	15
Bookbinder	1	—	Novice	—	1
Bookkeeper	—	5	Nursemaid	—	2
Cabinet-maker	1	—	Nurse, Student	—	7
Carpenter	6	—	Nurse, Graduate	1	—
Carpenter's helper	1	—	Orderly	1	—
Cashier	—	1	Organ builder	1	—
Chauffeur	6	—	Operator, Elevator	—	1
Chef	1	—	Operator, Telephone	—	3
Clerk, Stock	1	—	Operator, Telegraph	1	—
Clerk, Office	32	17	Pattern maker	1	—
Collar maker	—	1	Paying teller	1	—
Conductor	2	—	Paymaster	2	—
Cook	2	1	Police officer	3	—
Coppersmith	1	—	Polisher	1	—
Cutter, Meat	2	—	Printer	5	1
Cutter, Stone	1	—	Proprietor, Pool-room	1	—
Dentist's assistant	—	2	Proprietor, Restaurant	1	—
Dressmaker	—	5	Professional entertainer	1	1
Drop-forgers	1	—	Real estate	2	—
Electrician	4	—	Repairman	2	—
Electrician's helper	1	—	Salespeople	14	10
Electrician, Locomotive	1	—	Secretary	—	1
Engineer	1	—	Sewer	—	1
Engineer's assistant	1	—	Shipper	8	—
Expressman	1	—	Shoemaker	6	3
Factory	14	17	Sheet metal worker	1	—
Farmer	3	—	Silver finisher	1	—
Fireman, Stationary	4	—	Sorter	—	2
Fireman	1	—	Steel worker	1	—
Foreman	1	—	Stenographer	—	9
Freight handler	1	—	Storekeeper	2	—
Furniture mover	2	—	Students	17	4
General work	9	—	Superintendent	1	—
Horse trainer	1	—	Tailor	1	1
Housewife	—	108	Teacher, Music	—	2
Hospital attendant	1	—	Teacher, School	1	1
Housework	—	14	Theatrical manager	1	—
Hotel proprietor	1	—	Teamster	2	—
Inspector	4	1	Timekeeper	1	1
Inspector, Registers	—	1	Typist	—	2
Janitor	3	—	Waitress	—	1
Jewel repairer	—	1	Watchmaker	1	—
Keeper of birds	1	—	Weaver	2	1
Laborer	20	—	Welder, Acetylene	1	—
Laundress	—	1	Wireworker	3	—
Librarian, Assistant	—	1	Woodworker	1	—
Lineman	1	—	Yard clerk	1	—
Machine operator	1	1			

Total number of occupations, 117; total number of patients, 538.

TABLE 7. — *Stage of Disease at Admission.*

	Males.	Females.	Total.	Percentage.
Incipient	55	56	111	21
Moderately advanced	97	91	188	35
Far advanced	113	104	217	40
Unclassified	12	10	22	4
Totals	277	261	538	

TABLE 8. — *Condition on Discharge.*

	Males.	Females.	Total.	Percentage.
Arrested	11	15	26	5.03
Apparently arrested	21	7	28	5.42
Quiescent	142	113	255	49.30
Improved	26	32	58	11.22
Unimproved	20	29	49	9.49
Deaths	32	26	58	11.22
Non-tuberculous	1	6	7	1.35
No diagnosis	1	1	2	.39
Not considered	12	22	34	6.58
Totals	266	251	517	

TABLE 9. — *Deaths.*

DURATION OF DISEASE.	Males.	Females.	Total.	LENGTH OF RESIDENCE A SANATORIUM		
				Males.	Females.	Total.
Under 1 month	—	—	—	3	1	4
1 to 2 months	—	—	—	4	1	5
2 to 3 months	—	—	—	4	2	6
3 to 4 months	—	—	—	1	1	2
4 to 5 months	1	—	1	1	2	3
5 to 6 months	1	1	2	2	3	5
6 to 7 months	1	—	1	—	1	1
7 to 8 months	—	—	—	1	3	4
8 to 9 months	—	—	—	2	2	4
9 to 10 months	1	1	2	2	2	4
10 to 12 months	3	3	6	5	—	5
12 to 18 months	4	7	11	4	6	10
18 to 24 months	3	3	6	3	2	5
Over 2 years	18	11	29	—	—	—
	32	26	58	32	26	58

TABLE 10. — *Cause of Death.*

	Males.	Females.	Total.
Pulmonary tuberculosis	30	25	55
An acute exacerbation of chronic nephritis	1	0	1
Suicide	1	0	1
Lung abscess	0	1	1
	32	26	58

WESTFIELD STATE SANATORIUM.

RESIDENT OFFICERS.

HENRY D. CHADWICK, M.D., *Superintendent.*
 ROY MORGAN, M.D., *Assistant Superintendent.*
 HEMAN B. CHASE, M.D., *Physician.*
 OLGA GOTTER, M.D., *Assistant Physician.*
 EMILY B. MORGAN, *Superintendent of Nurses and Matron.*
 EDITH M. SAUERS, *Dietitian.*
 FLORENCE I. SMITH, *Steward.*
 BENJAMIN J. SANDIFORD, *Chief Engineer.*
 ROBERT J. GOLDBERG, *Farmer.*

REPORT OF THE SUPERINTENDENT.

TO EUGENE R. KELLEY, M.D., *Commissioner, Department of Public Health:*

I have the honor to submit the fourteenth annual report of the Westfield State Sanatorium for the year ending Nov. 30, 1923.

During the year there has been expended \$206,707.47 for maintenance, a gross weekly per capita cost of \$14.977. The details of these disbursements are contained in the report of the treasurer.

There has been collected from miscellaneous sources \$46,585.61. Deducting this amount from the gross maintenance expense leaves a net expense of \$160,121.86, and a net weekly per capita cost of \$11.602. There has been collected from private funds \$3,207.28; from cities and towns, \$40,412.84; 28 cases were supported wholly or in part from private funds; 227 by cities and towns; 69 wholly by the State; 16 by the Department of Public Welfare; 46, status undetermined.

There were 267 patients in the Sanatorium at the beginning of the year, 266 at the close. The largest number present at one time was 275, and the smallest 237. The daily average number of patients was 265.4. There were 308 cases admitted during the year; 98 hilum tuberculosis, 67 minimal, 14 moderately advanced, 40 advanced, 74 bronchial adenitis, 2 tuberculous peritonitis, 3 bone tuberculosis, 1 general tuberculosis, 1 empyema, 4 pulmonary abscess, 1 osteomyelitis, 1 malnutrition, 1 sub-acute endocarditis, 1 valvular heart disease. There were 200 cases admitted from cities and towns of over 25,000 population, and 108 from cities and towns under 25,000 population. The average age of patients admitted was 11.36 years. Including deaths, there were 309 discharges, and the average duration of residence was 10 months and 10 days. Of those discharged 239 gained 3,197.75 pounds, an average gain of 13.3 pounds per person. Of the discharges there were 77 apparently well, 131 apparently arrested, 37 less than last year; 4 quiescent,

2 more than last year; 47 improved, and 22 unimproved. There were 28 deaths, 6 more than last year. There were 96,873 hospital days of treatment, 57 more than last year.

The following table shows the classification on the application blank and our classification on admission:

	Classification on Application Blank.	Our Classification on Admission.
Bronchial adenitis	0	74
Hilum tuberculosis	2	98
Minimal	207	67
Moderately advanced	63	14
Advanced	8	40
Tuberculous peritonitis	0	2
Bone tuberculosis	0	3
General tuberculosis	0	1
Empyema	0	1
Pulmonary abscess	0	4
Osteomyelitis	0	1
Malnutrition	0	1
Sub-acute endocarditis	0	1
Valvular heart disease	0	1
Unclassified	28	0
	308	308

MEDICAL REPORT.

An explanation is necessary in regard to two terms used for the first time in our classification of patients. The term "bronchial adenitis" is used to define cases when the physical examination shows only enlarged tracheobronchial glands. The tuberculin test is usually positive, but occasionally it is negative. A definite diagnosis of tuberculosis is not justified because these glands may be enlarged as the result of other respiratory diseases, measles and whooping cough. About 5 per cent of the cases do not react to tuberculin. Other cases that do react may have enlarged glands from other causes, but as they are infected with tubercle bacilli they are potentially tuberculous. These children could be as well cared for in preventoria if such provision was available. Twenty-four and three-tenths per cent of our admissions come under this classification. The term "hilum tuberculosis" is used to describe those cases where the tracheobronchial glands are enlarged with more or less infiltration of surrounding tissue, and where there is also peribronchial thickening involving the larger bronchi, extending outward from the hilum. This condition precedes parenchymatous involvement of the lungs and is the type of tuberculosis most often found in children under twelve years of age. Thirty-one and eight-tenths per cent of our admissions were of this type. The need of these two terms is apparent as our tables show that 207 of the patients admitted were diagnosed as being in the minimal stage of tuberculosis. We found, by careful examination, confirmed by x-ray films, that of these cases 172 showed no evidence of the pulmonary type of tuberculosis to which the term minimal applies. The physicians, however, who made the applications for admission, had no other term to use. The need of other designations in classifying juvenile tuberculosis is thus clearly demonstrated.

TUBERCULIN TESTS.

We have given intradermal tuberculin tests to all the non-bacillary cases. We have used it in varying doses. The initial dose was 1/10 of 1 c.c. of a dilution 1 to 1000. Thirty per cent of the cases were negative to this test. Twelve of these negative cases were given 1/10 of 1 c.c. of a dilution 1 to 500, and seven gave a positive reaction. Twenty-eight of the negative cases were given a dose of 1/10 cc of a dilution 1 to 100 and seven of these gave a positive reaction. Five of the cases that were found negative to that dose were given 1/10 c.c. of a dilution 1/ to 10 and two reacted. This experiment indicates that the cases that are negative to a weak solution of tuberculin should be given other tests of a stronger dilution before calling them non-tuberculous. Our routine now is to give intracutaneously an initial dose equivalent to .01 mg. of tuberculin, following this in the negative cases with .1 mg., and if then there is no reaction give a third test with a dose of 1 mg. If no reaction follows, we consider the case non-tuberculous. We are much indebted to Dr. E. R. Baldwin for furnishing our supply of tuberculin from the Saranac laboratory.

SCHICK TESTS.

Each patient is given this test soon after admission. Our results were as follows: Positive, 140; negative, 132; pseudo, 19; combined, 22; making a total of 313.

The positive cases, including the combined, were 51 per cent. The positive cases were immunized with toxin-antitoxin.

CLINICS.

We have held 48 examination clinics in 35 different localities in Hampden, Hampshire and Franklin counties. Six of these clinics were conducted in co-operation with Dr. O'Brien of the Hampshire County Sanatorium. In addition to the clinic work in the western sections of the State, Dr. Morgan spent one day each at clinics in Reading, Everett, Hudson and Milford, and two days in Gloucester. Two members of the staff served as examiners for two days at the Boston Health Show.

	Positive.	Negative.	Suspicious.	Re-examined.	Total.
1. Consultation clinics	60	70	44	55	229
2. Examination clinics	63	868	323	158	1,412
3. Out-patients	122	99	30	62	313
	245	1,037	397	275	1,954

This table shows that 245 new cases of tuberculosis were diagnosed, or 12 per cent of the total number examined.

The following table illustrates the growth of the extra sanatorium work done at Westfield for the past three years:

	1921.	1922.	1923.
Consultation clinics	111	169	229
Examination clinics	354	1,286	1,412
Out-patients	118	187	313
	583	1,642	1,954
Out-patient x-rays	71	154	344

This clinic work would not be possible if it were not for the splendid cooperation of the Public Health Associations of Hampden, Hampshire and Franklin counties. The coming year the Hampden County Association has a clinic scheduled for every two weeks. An active tuberculosis association is needed in Berkshire County. When that is functioning efficiently the western section of the State will be well covered with clinics.

DENTISTRY.

The dental work of the institution has been done in a most systematic and satisfactory way during the past year. The following is Dr. Loft's summary of the work accomplished:

Oral examinations, 429	Cement fillings, 297
Prophylaxis, 298	Synthetic porcelain restorations, 52
Deciduous extractions, 241	Radiographs, 100
Extractions of permanent teeth, 124	Prophylactic sedative dressings, 267
Devitalizations, 3	Odontalgia relief, 15
Root canal dressings, 50	Gingivitis, 6
Root canals filled, 22	Silver nitrate application, 85
Amalgam restorations, 92	Irrigation and drainage, 25
Amalgam with pulp capping, 111	Bridge restorations, 4
Amalgam fillings, 341	Inlays, 4

SANATORIUM SCHOOL.

The school building is now overcrowded and more class room space will be necessary to provide for the increase in the number of patients of school age. Plans for such an addition should be prepared and an appropriation asked for in next year's budget. Before this is done, however, a comprehensive plan for the future development of the sanatorium should be decided upon so that any contemplated increase in the population of the sanatorium could be provided for.

Average Daily Attendance.

Grade I	20.01
Grade II	23.19
Grade III	18.38
Grade IV	20.14
Grade V	28.28
Grade VI	25.71
Grade VII	20.78
Grade VIII	8.80
Domestic Science	15.64
Manual Training	25.47
	<hr/>
Total enrollment	206.40
	427

FARM.

We have carried on the usual farm activities with very good results as far as crops are concerned. The outstanding accomplishment has been in disposing of our herd of tuberculous cows and replacing them with a herd of Ayrshires. The cows and bull purchased are all from pure bred stock and come from federal accredited herds so we may be reasonably sure that they are free from tuberculosis. The barn has been remodeled and a modern ventilating system installed.

IMPROVEMENTS.

A special appropriation of \$900 for the purchase of a pasture was made this year. The agreement has been made and the papers will be passed as soon as the Attorney-General has approved the title.

A 50,000-gallon steel water tank on an 80-foot tower has been erected to replace the 30,000-gallon tank that collapsed in the ice storm last winter. This will give us better fire protection and assure us of an adequate storage supply for domestic needs.

A permanent addition has been made to the Administration Building that provides for more office space and an apartment for one of the physicians.

The extraordinary expenses represented by the above items are as follows: Cost of replacing cows, \$6,250; addition to Administration Building, \$2,000; remodelling dairy barn, \$2,500; water tank and tower, \$7,000; total, \$17,750. These expenditures add \$1.49 to our gross per capita cost.

RECOMMENDATIONS.

A cottage house for the superintendent. The reasons why this is necessary were fully covered in my report of last year. For the development of the institution and for the proper housing of the medical and nursing staff this building is necessary.

ACKNOWLEDGMENTS.

Religious services have been held every Sunday by each of the Protestant, Catholic and Jewish chaplains. The personnel is unchanged. Each clergyman has evinced much interest in the welfare of the patients and aided in the orderly administration of the institution.

Many gifts of fruit, games and toys have been contributed by individuals and organizations.

To the staff and employees I am deeply grateful for their efficient work during the past year. Fortunately for the institution and for me there have been no resignations in the medical staff or heads of departments during the year.

HENRY D. CHADWICK, *Superintendent.*

VALUATION.

Land.

Grounds, 26.8 acres	\$5,175.00	
Lawns and buildings, 26.8 acres.		
Roads, 0 acres.		
Woodland, 97.6 acres	4,764.00	
Mowing, 1 acre	120.00	
Tillage, 53 acres	3,925.00	
Tillage, 42.5 acres.		
Garden, 10.5 acres.		
Orchard, 2.0 acres	400.00	
Pasture, 13.1 acres	747.00	
Waste and miscellaneous, 12.6 acres	690.50	
Rough pasture, 7.6 acres.		
Meadow swamp land, 0 acre.		
Sewer beds, 4 acres.		
New coal trestle, 1 acre.		
	<u>\$15,821.50</u>	
Sewerage system	13,353.80	
Total.		\$29,175.30

Buildings.

Institution buildings	\$162,292.29	
Farm, stable and grounds	26,370.00	
Miscellaneous	57,530.90	\$246 193.19
		<u>\$275,368.49</u>
Present value of all personal property, as per inventory of Dec. 1, 1923		88,196.15
Total valuation		<u>\$363,564.64</u>

POPULATION.

	Males.	Females.	Totals.
Number received during the year	157	151	308
Number passing out of the institution during the year	153	156	309
Number at end of fiscal year in the institution	127	139	266
Daily average attendance (number of inmates actually present during the year)	134.95	130.45	265.4
Average number of employees and officers during the year	65	44	109

EXPENDITURES.

Current expenditures:			
1. Salaries and wages	\$89,462.60		
2. Clothing	1,144.83		
3. Subsistence	33,072.14		
4. Ordinary repairs	9,787.57		
5. Office, domestic and outdoor expenses	55,490.33		
			<u>\$188,957.47</u>
Extraordinary expenses:			
1. Permanent improvements to existing buildings	\$11,500.00		
2. New herd of cows	6,250.00		17,750.00
Grand total			<u>\$206,707.47</u>

Summary of Current Expenses.

Total expenditure	\$206,707.47	
Deducting extraordinary expenses	17,750.00	
		<u>\$188,957.47</u>
Deducting amount of sales		2,827.71
		<u>\$186,129.76</u>

Dividing this amount by the daily average number of patients, 265.40, gives a cost for the year of \$701.317, equivalent to an average weekly net cost of \$13.486.

STATISTICAL TABLES.

TABLE 1. — *Admissions and Discharges.*

	Males.	Females.	Totals.
Number of patients admitted Dec. 1, 1922, to Nov. 30, 1923, inclusive..	157	151	308
Number of patients discharged Dec. 1, 1922, to Nov. 30, 1923, inclusive..	153	156	309
Number of deaths (including those in previous item)	8	20	28
Number in Sanatorium, Dec. 1, 1922	135	132	267
Number remaining Nov. 30, 1923	127	139	266

TABLE 2. — *Civil Condition of Patients Admitted.*

	Males.	Females.	Totals.
Married	0	0	0
Single	157	151	308
Widowed	0	0	0
Totals	<u>157</u>	<u>151</u>	<u>308</u>

TABLE 3. — *Ages of Patients Admitted.*

	Males.	Females.	Totals.
1 to 13 years	128	106	234
14 to 20 years	28	44	72
21 to 30 years	1	1	2
31 to 40 years	0	0	0
41 to 50 years	0	0	0
51 to 60 years	0	0	0
60	0	0	0

TABLE 4. — *Places of Nativity.*

PLACES OF NATIVITY	MALES.			FEMALES.			TOTALS.		
	Patients.	Fathers.	Mothers.	Patients.	Fathers.	Mothers.	Patients.	Fathers.	Mothers.
United States:									
Massachusetts	132	39	45	114	38	38	246	77	83
Other N. E. States	6	7	3	5	10	9	11	17	12
Other States	5	13	9	12	14	7	17	27	16
Total natives	143	59	57	131	62	54	274	121	111
Other Countries:									
Armenia	1	1	—	2	3	2	3	4	2
Albania	1	1	1	—	—	—	1	1	1
Austria	—	—	—	—	1	2	—	1	2
Argentina, S. A.	1	—	—	—	—	—	1	—	—
Barb does	—	1	—	—	—	—	—	1	—
British West Indies ..	—	—	—	—	1	—	—	1	—
Canada	1	19	15	4	17	18	5	36	33
Denmark	—	—	1	—	—	—	—	—	1
England	—	4	2	—	1	2	—	5	4
Finland	—	—	—	—	2	2	—	2	2
Germany	—	—	1	1	4	1	1	4	2
Greece	—	2	2	1	2	2	1	4	4
Holland	1	1	1	—	1	1	1	2	2
Ireland	—	8	13	—	4	9	—	12	22
Italy	2	16	13	4	15	14	6	31	27
Lithuania	—	1	—	—	1	—	—	2	—
Madeira Islands	1	—	1	—	—	—	1	—	1
Poland	—	9	12	—	6	5	—	15	17
Portugal	—	1	—	—	5	5	—	6	5
Russia	—	5	3	1	3	5	1	8	8
Czecho-Slovakia	—	—	—	—	1	1	—	1	1
Scotland	—	1	—	3	4	3	3	5	3
Sweden	—	1	1	—	1	—	—	2	1
Syria	—	1	1	—	1	1	—	2	2
Switzerland	—	—	—	1	1	1	1	1	1
Unknown	8	72	67	17	74	74	25	146	141
	6	26	33	3	15	23	9	41	56
Grand totals	157	157	157	151	151	151	308	308	308

TABLE 5. — *Residence of Patients Admitted.*

Adams, 2	Fall River, 3	Methuen, 1
Agawam, 3	Fitchburg, 1	Milton, 1
Amherst, 3	Framingham, 1	Monson, 1
Belmont, 1	Franklin, 1	Needham, 1
Beverly, 1	Gardner, 2	New Bedford, 3
Bondsville, 2	Gloucester, 2	Newton, 1
Boston, 55	Hardwick, 1	Northampton, 2
Brockton, 2	Haverhill, 2	Norwood, 2
Brookline, 1	Hinsdale, 1	Palmer, 1
Cambridge, 3	Holyoke, 6	Pittsfield, 23
Charlemont, 1	Hopkinton, 1	Plymouth, 4
Charlestown, 6	Hudson, 1	Provincetown, 1
Chelmsford, 2	Jefferson, 1	Quincy, 1
Chelsea, 2	Lancaster, 1	Reading, 2
Chicopee, 4	Leominster, 8	Readville, 1
Cohasset, 2	Lowell, 12	Revere, 1
Easthampton, 3	Ludlow, 2	Russell, 2
East Longmeadow, 1	Lynn, 15	Salem, 6
Everett, 2	Malden, 4	Somerville, 2
	Marlboro, 3	Southampton, 1

TABLE 5.— *Residence of Patients Admitted.*— (Continued.)

Southbridge, 1	Taunton, 1	Whitinsville, 1
South Hadley, 2	Templeton, 1	Winchester, 1
Southwick, 1	Wakefield, 2	Woburn, 5
Springfield, 41	Westfield, 14	Worcester, 9
State minor wards, 2	West Springfield, 6	Total, 308.

TABLE 6.— *Occupation of Cases Admitted.*

	Male.	Female.	Total.
Clerk	0	1	1
Home	0	1	1
School	155	148	303
Shoe Factory	1	0	1
Tailor	1	0	1
Teacher	0	1	1
	157	151	308

TABLE 7.— *Stage of Disease at Admission.*

	Males.	Females.	Total.	Percentage.
Bronchial Adenitis	43	31	74	24.03
Hilum Tuberculosis	56	42	98	31.82
Minimal	30	37	67	21.75
Moderately advanced	6	8	14	4.54
Advanced	11	29	40	12.97
Tuberculous Peritonitis	2	0	2	.65
Bone Tuberculosis	2	1	3	.97
General Tuberculosis	0	1	1	.33
Empyema	0	1	1	.32
Pulmonary Abscess	3	1	4	1.30
Osteomyelitis	1	0	1	.33
Malnutrition	1	0	1	.33
Sub-acute Endocarditis	1	0	1	.33
Valvular Heart Disease	1	0	1	.33
	157	151	308	100.00

TABLE 8.— *Condition on Discharge.*

	Males.	Females.	Total.	Percentage.
Apparently well	41	36	77	24.92
Apparently arrested	68	63	131	42.40
Quiescent	1	3	4	1.29
Improved	28	19	47	15.21
Unimproved	7	15	22	7.12
Died	8	20	28	9.06
	153	156	309	100.00

TABLE 9.— *Deaths.*

DURATION OF DISEASE.				LENGTH OF RESIDENCE AT SANATORIUM.		
	Males.	Females.	Total.	Males.	Females.	Total.
Under 1 month	0	0	0	2	5	7
1 to 2 months	0	1	1	0	3	3
2 to 3 months	0	1	1	0	2	2
3 to 4 months	1	1	2	1	1	2
4 to 5 months	0	0	0	0	0	0
5 to 6 months	0	1	1	0	2	2
6 to 7 months	1	2	3	2	0	2
7 to 8 months	0	2	2	0	0	0
8 to 9 months	0	0	0	0	0	0
9 to 10 months	1	1	2	0	0	0
10 to 12 months	0	1	1	1	3	4
12 to 18 months	3	3	6	0	1	1
18 to 24 months	0	1	1	0	0	0
Over 2 years	2	6	8	2	3	5
	8	20	28	8	20	28

TABLE 10.— *Cause of Death.*

	Males.	Females.	Total.
Tuberculosis of the Lungs	6	17	23
Tuberculous Pneumonia	0	1	1
Tuberculous Enteritis	0	1	1
Tuberculous Peritonitis	1	0	1
Tuberculous Meningitis	1	0	1
Nephritis and Cardiac Disease	0	1	1
	8	20	28

NORTH READING STATE SANATORIUM.

RESIDENT OFFICERS.

CARL C. MACCORISON, M.D., *Superintendent*.
 EARLE C. WILLOUGHBY, M.D., *Assistant Superintendent*.
 JOSEPH W. REDDY, M.D., *First Assistant Physician*.
 BERNARD H. APPLE, M.D., *Assistant Physician*.
 SAMUEL RANDALL, D.M.D., *Dentist*.
 WILLIAM B. DAVIDSON, M.D., *Consulting Roentgenologist*.
 CATHERINE RYAN, R.N., *Superintendent of Nurses*.
 MIRA B. ROSS, *Head Matron*.
 J. ELLIS DOUCETTE, *Steward*.
 DANIEL J. SCOTT, *Chief Engineer*.
 EDWARD J. LEARY, *Farmer*.

REPORT OF THE SUPERINTENDENT.

TO EUGENE R. KELLEY, M.D., *Commissioner, Department of Public Health*:

I have the honor to submit the fifteenth annual report of the North Reading State Sanatorium for the year ending Nov. 30, 1923.

During the year there has been expended \$147,745.22 for maintenance, a gross weekly per capita cost of \$15.0961, and \$6,727.27 from the appropriations authorized by Chapter 129, Resolves of 1922, and \$1,487.67 for engine and generator, under Chapter 126, Acts of 1923. The details of these disbursements are contained in the report of the treasurer.

There has been collected from miscellaneous sources \$30,284.99 (the total of all collections). Deducting this amount from the gross maintenance expenses leaves a net expense of \$116,460.23. The net weekly per capita cost was \$12.0018. There has been collected from private funds \$7,732.46; from cities and towns, \$21,929.64. 98 cases were supported wholly or in part by private funds; 207 by cities and towns, and 91 wholly by the State.

There were 190 patients at the Sanatorium at the beginning of the year, 189 at the close. The largest number present at any one time was 199, and the smallest 176. The daily average number of patients was 188.21. There were 259 cases admitted during the year; 31 minimal; 99 moderately advanced; 127 advanced; 2 unclassified. There were 215 cases admitted from cities and towns of over 25,000 population, and 45 from cities and towns under 25,000 population. The average age of patients admitted was 31.57, including deaths. There were 260 patients discharged, and the average duration of residence was 23 months and 4 days. Of those discharged 140 gained 2,198 pounds, an average gain of 15.7 pounds per person. Of the discharges there were 3 arrested cases, the same as last year; 9 apparently arrested, 6 more than last year; 37 quiescent, 7 more than last year; 80 improved; 45 unimproved. There were 14 patients not considered — the duration of treatment being less than one month. There were 69 deaths, 33 more than last year, and 3 discharged as non-tuberculous. There were 68,696 hospital days of treatment, 1,781 less than last year.

The following table shows the classification on the application blank and our classification on admission.

	Classification on Application Blanks.	Our Classification on Admission.
Minimal	28	31
Incipient	30	—
Moderately advanced	169	99
Advanced	29	127
Far advanced	1	—
Unclassified	1	2
Undetermined	1	—
	259	259

MEDICAL REPORT.

We have admitted more and more bed cases during the year and it has been necessary to treat many of these cases on Pavilion A, East and West. This has necessitated adding two additional employees to our ward service. We have employed helio-therapy to a greater extent during the past year. Temporary structures were provided for both units for use on pleasant days, where selected cases

loughby and Reddy. On July 6, 1923, Dr. Bernard H. Apple was added to the medical staff.

IMPROVEMENTS.

A very decided improvement was made in our power plant by overhauling and simplifying the connections and switching arrangements on our switchboard. The wiring between the board and generators and the output from same was also changed very extensively. One of our units was re-compounded, making it possible, together with the re-wiring, to operate our two units in parallel. A recording watt meter giving a direct reading of our total electrical output was also installed. These alterations and additions will probably take care of our increasing light and power load for some time to come, thus doing away with the necessity of installing a new generating unit.

The south side of the roofs of the East and West wards and the roof and walls of the farmhouse were re-shingled.

Hand stokers, draft gauges and a new Venturi meter were installed in the power plant.

Twelve hundred and twenty-five square yards of our main driveway were repaired.

RECOMMENDATIONS.

Cottage for Superintendent. — More room is needed for assistant physicians if we wish to extend the work of consultation clinics. The dining rooms used by the staff and nurses are overcrowded. The best solution of this problem would be the construction of a cottage for the Superintendent and his family, and the utilization of his present quarters for the staff. The estimated cost is \$18,579.

Employees' Quarters. — The overcrowded condition of the employees' quarters is becoming more and more of a problem. Our quota calls for 90 employees and we have but 70 beds for non-tuberculous employees. A dormitory sufficiently large to accommodate 20 people is badly needed. The estimated cost is \$28,000.

Locker and Toilet Rooms. — The appropriation made in 1922 for locker rooms and glazing in front of pavilions was inadequate for the completion of the entire work. It was necessary to omit locker and toilet rooms on Pavilion B, East and West. These are badly needed. We estimate that this work can be done for \$13,930.

ACKNOWLEDGMENTS.

Catholic and Protestant services have been held each Sunday during the year and Jewish services on Tuesdays.

I wish to express my appreciation of the gifts made to the sanatorium of books, magazines, clothing, etc., and I am especially grateful to those who have come to the sanatorium to entertain the patients.

We have passed through one of the most trying ordeals in the institution's history relative to the personnel of our ward and domestic service. We owe much to the loyalty and hard work of the heads of departments and their subordinates who have so faithfully filled the gap at a time when the outlook was most discouraging.

Respectfully submitted,

CARL C. MACCORISON, *Superintendent.*

VALUATION.

Land.

Grounds, 11.82 acres	\$569.37
Lawns and buildings, 11.07 acres.	
Roads, .75 acres.	
Woodland, 23.66 acres	1,139.70
Mowing, 15.90 acres	766.10
Tillage, 7.13 acres	343.45
Tillage, 2 acres.	
Garden, 5.13 acres.	
Orchard, 2.61 acres	125.72
Pasture, 2.09 acres	100.67
Waste and miscellaneous, 38.54 acres	1,856.47
Rough pasture, 7.79 acres.	
Meadow swamp land, 30 acres.	
New coal trestle, .75 acres.	
	<hr/>
	\$4,901.48
Sewage system	7,567.31
	<hr/>
	\$12,468.79

Buildings.

Institution buildings	\$175,588.68	
Barn, stable and grounds	16,392.00	
Miscellaneous	92,729.34	284,710.02
		<hr/>
Present value of all personal property as per inventory of Dec. 1, 1923		\$297,178.81
		<hr/>
Grand total		\$389,568.99

POPULATION.

	Males.	Females.	Totals.
Number received during the year	146	113	259
Number passing out of the institution during the year	147	113	260
Number at end of fiscal year in the institution	103	86	189
Daily average attendance (number of inmates actually present during the year)	104.68	83.53	188.21
Average number of employees and officers during the year	47.411	33.666	81.077

EXPENDITURES.

Current expenditures:		
1. Salaries and wages	\$71,562.75	
2. Clothing	56.52	
3. Subsistence	56,371.81	
4. Ordinary repairs	2,953.24	
5. Office, domestic and outdoor expenses	13,154.41	
		<hr/>
Extraordinary expenses:		\$144,098.73
1. Permanent improvements to existing buildings		3,646.49
		<hr/>
Grand total		\$147,745.22

Summary of Current Expenses.

Total expenditure	\$147,745.22
Deducting extraordinary expenses	144,098.73
Deducting amount of sales	143,729.02

Dividing this amount by the daily average number of patients, 188.21, gives a cost for the year of \$763.66, equivalent to an average weekly net cost of \$14.68.

TABLE 1. — *Admissions and Discharges.*

	Males.	Females.	Total.
Patients in Sanatorium, December 1, 1922	104	86	190
Patients admitted from December 1, 1922, to November 30, 1923, inclusive	146	113	259
Patients discharged from December 1, 1922, to November 30, 1923, inclusive	147	113	260
Patients remaining in Sanatorium, November 30, 1923	103	86	189
Daily average number patients	104.68	83.53	188.21
Deaths (included in number discharged)	42	27	69

TABLE 2. — *Civil Condition of Patients Admitted.*

	Males.	Females.	Total.
Single	69	56	125
Married	70	46	116
Widowed	6	10	16
Divorced	1	1	2
	<hr/>	<hr/>	<hr/>
	146	113	259

TABLE 3. — *Age of Patients Admitted.*

	Males.	Females.	Totals.	Percentage.
14 to 20 years	9	16	25	9.65
20 to 30 years	58	58	116	44.79
30 to 40 years	38	20	58	22.40
40 to 50 years	23	13	36	13.90
Over 50 years	18	6	24	9.26
	<hr/>	<hr/>	<hr/>	
Average age	33.5	29.03	31.57	

TABLE 4. — *Nativity and Parentage of Patients Admitted.*

PLACE OF NATIVITY.	MALES.			FEMALES.			TOTALS.		
	Patients.	Fathers.	Mothers.	Patients.	Fathers.	Mothers.	Patients.	Fathers.	Mothers.
United States:									
Massachusetts	58	19	14	54	13	17	112	32	31
Other N. E. States	10	8	7	9	10	7	19	18	14
Other States	10	8	9	6	4	2	16	12	11
Total	78	35	30	69	27	26	147	62	56
Other Countries:									
Armenia	1	1	1	—	—	—	1	1	1
Austria	1	1	1	—	2	2	1	3	3
Bermuda	1	—	1	—	—	—	1	—	1
Brazil	—	1	—	—	1	—	—	2	—
Canada	10	17	23	10	21	21	20	38	44
Cape Verde Islands	1	1	1	—	—	—	1	1	1
Cuba	—	—	—	1	1	1	1	1	1
England	4	6	5	1	5	7	5	11	12
Finland	—	—	—	1	1	—	1	1	—
France	—	—	—	—	2	1	—	2	1
Germany	1	1	1	1	3	1	2	4	2
Greece	3	3	3	1	1	1	4	4	4
Hungary	1	1	1	—	—	—	1	1	1
Ireland	14	37	36	12	25	27	26	62	63
Italy	11	16	16	3	4	4	14	20	20
Lithuania	2	2	2	1	1	1	3	3	3
Norway	—	—	—	—	1	—	—	1	—
Palestine	1	1	1	—	—	—	1	1	1
Poland	3	3	3	—	—	—	3	3	3
Portugal	3	3	4	1	2	3	4	5	7
Roumania	1	—	1	—	—	—	1	—	1
Russia	7	9	8	7	8	8	14	17	16
Scotland	—	2	2	2	3	2	2	5	4
Sweden	1	3	3	2	3	4	3	6	7
Syria	1	1	1	—	—	—	1	1	1
Turkey	1	1	1	1	1	1	2	2	2
Total foreign	68	110	115	44	85	84	112	185	199
Unknown	—	1	1	—	1	3	—	2	4
Grand totals	68	111	116	44	86	87	112	187	203

TABLE 5. — *Residence of Patients Admitted.*

Amesbury, 1	Hingham, 1	Quincy, 1
Arlington, 2	Hudson, 1	Reading, 3
Billerica, 1	Ipswich, 1	Revere, 2
Boston, 125	Lawrence, 9	Rutland, 3
Brockton, 1	Leominster, 2	Salem, 1
Brookline, 1	Lexington, 1	Somerville, 13
Cambridge, 3	Lowell, 7	Springfield, 1
Chelmsford, 2	Lynn, 5	Stoneham, 2
Chelsea, 11	Malden, 9	Townsend Harbor, 1
Chicopee Falls, 1	Marlboro, 2	Tyngsboro, 1
Concord, 1	Medford, 4	Wakefield, 3
Dracut, 1	Melrose, 1	Waltham, 3
Essex, 1	Methuen, 2	Westboro, 1
Everett, 9	Nahant, 1	West Boylston, 1
Fitchburg, 1	Newton, 2	Wilmington, 1
Framingham, 1	North Agawam, 1	Winthrop, 1
Gilbertville, 1	Peabody, 1	Woburn, 2
Haverhill, 6		Total, 259.

TABLE 6.—*Occupation of Patients Admitted.*

	Males.	Females.		Males.	Females.
Accountant.....	1	—	Merchant.....	3	—
Actor.....	1	—	Metal worker.....	1	—
Agent.....	1	—	Mill operative.....	6	8
Assistant steward.....	1	—	Nurse (graduate).....	—	2
Attendant.....	3	2	Nurse (pupil).....	—	1
Barber.....	1	—	Nursemaid.....	—	1
Bookkeeper.....	—	3	Office boy.....	1	—
Buyer.....	1	—	Painter.....	1	—
Carpenter.....	3	—	Peddler.....	2	—
Cashier.....	—	1	Personal maid.....	—	1
Chauffeur.....	3	—	Photographer.....	1	—
Chef.....	1	—	Porter.....	1	—
Chemical worker.....	1	—	Printer.....	1	—
Clerk.....	17	12	Salesgirl.....	—	1
Cloth cutter.....	1	—	Salesman.....	10	—
Conductor.....	1	—	Sawyer.....	1	—
Cook.....	1	—	Secretary.....	1	—
Dairy worker.....	1	—	Shoemaker.....	4	—
Domestic.....	—	3	Shoe worker.....	10	2
Dressmaker.....	—	1	Sign builder.....	1	—
Electrician.....	1	—	Sign painter.....	1	—
Elevator man.....	1	—	Stationary fireman.....	1	—
Factory worker.....	1	6	Steam fitter.....	1	—
Florist.....	1	—	Stenographer.....	—	5
Foreman.....	1	—	St. railway employee.....	1	—
General work.....	—	1	Student.....	3	6
Hairdresser.....	—	1	Tailor.....	3	—
Horse trainer.....	2	—	Tailoress.....	—	2
Housewife.....	—	37	Teamster.....	9	—
Housework.....	—	10	Telephone operator.....	1	—
Iron-worker.....	2	—	Tool maker.....	1	—
Janitor.....	3	—	Waiter.....	2	—
Kitchen helper.....	—	1	Waitress.....	—	2
Laborer.....	16	—	Weaver.....	1	—
Laundress.....	—	1	Wire weaver.....	1	—
Laundry man.....	1	—	Wood worker.....	2	—
Leather worker.....	1	—	Wool sorter.....	1	—
Lecturer.....	1	—	None.....	—	2
Mariner.....	1	—			
Mechanic.....	5	—	Totals.....	145	114

TABLE 7.—*Stage of Disease at Admission.*

	Males.	Females.	Total.	Percentage.
Minimal.....	20	11	31	11.97
Moderately advanced.....	61	38	99	38.23
Advanced.....	63	64	127	49.03
Unclassified.....	2	0	2	.77
Total.....	146	113	259	

TABLE 8.—*Condition on Discharge.*

	Males.	Females.	Total.	Percentage.
Non-tuberculous.....	3	0	3	1.15
Apparently arrested.....	5	4	9	3.46
Arrested.....	2	1	3	1.15
Quiescent.....	19	18	37	14.23
Improved.....	42	38	80	30.77
Unimproved.....	28	17	45	17.31
Not considered.....	6	8	14	5.39
Died.....	42	27	69	26.54
Total.....	147	113	260	

TABLE 9.—*Deaths.*

DURATION OF DISEASE.	Males.	Females.	Totals.	LENGTH OF RESIDENCE AT SANATORIUM.		
				Males.	Females.	Totals.
Under 1 month.....	—	1	1	1	1	2
1 to 2 months.....	—	—	—	3	4	7
2 to 3 months.....	—	—	—	4	3	7
3 to 4 months.....	1	—	1	3	2	5
4 to 5 months.....	—	—	—	6	—	6
5 to 6 months.....	—	—	—	2	—	2
6 to 7 months.....	1	1	2	3	1	4
7 to 8 months.....	2	2	4	4	2	6
8 to 9 months.....	1	—	1	2	1	3
9 to 10 months.....	2	—	2	1	—	1
10 to 12 months.....	—	2	2	1	5	6
12 to 18 months.....	3	5	8	3	6	9
18 to 24 months.....	3	2	5	5	1	6
Over 2 years.....	29	14	43	4	1	5
Totals.....	42	27	69	42	27	69

TABLE 10. — *Cause of Death.*

	Males.	Females.	Totals.
Tuberculosis of lungs	41	26	67
TB laryngitis	1	—	1
Meningitis	—	1	1
Totals	42	27	69

REPORT OF STATE EXAMINERS OF PLUMBERS.

EXAMINATIONS.	Examined.	Passed.
Boston, Dec. 2, 1922	54	12
Lowell, Dec. 16, 1922	51	10
Boston, Jan. 6, 1923	66	21
Pittsfield, Jan. 20, 1923	15	3
Boston, Feb. 3, 1923	83	19
Springfield, Feb. 17, 1923	34	3
Boston, March 3, 1923	90	21
Fall River, March 17, 1923	43	9
Boston, April 7, 1923	92	13
Worcester, April 21, 1923	45	8
Boston, May 5, 1923	88	12
Lowell, May 19, 1923	40	13
Boston, June 2, 1923	94	16
Pittsfield, June 16, 1923	16	3
Boston, July 7, 1923	71	18
Boston, Sept. 1, 1923	81	17
Springfield Sept. 15, 1923	31	10
Boston, Oct. 6, 1923	101	27
Fall River, Oct. 20, 1923	41	11
Boston, Nov. 3, 1923	63	10
Worcester, Nov. 17, 1923	32	12
	1,231	268

Licenses issued on account of examination, Dec. 1, 1922, to Dec. 1, 1923 — Masters, 79; Journeymen, 189; total, 268.

Probationary licenses issued during year — Journeymen, 6.

Registrations — Masters, 5; Journeymen, 11.

Examinations — 21.

FEE RECEIVED.	Paid to Treasurer of Commonwealth.
1,231 examination fees at \$0.50	\$615.50
84 M. P. licenses issued at \$2.00	168.00
200 J. P. licenses issued at \$0.50	100.00
4,220 J. P. renewals at \$0.50	2,110.00
1,987 M. P. renewals at \$0.50	993.50
305 back fees at \$0.50	152.50
	\$4,139.50
Salaries	\$3,658.67
Travel	846.51
Express	29.36
Printing	125.86
Postage	110.00
Books and stationery	74.11
Telephone and lighting	130.79
Plumber's materials	10.20
Extra services	—
Cleaning	43.00
Miscellaneous	—
Total	\$5,028.50

Summary of Registrations.

Masters:	
Certificate holders (individual)	499
Licenses year ending May 1, 1923	3,075
Number of last Master License issued up to Aug. 1, 1923	3,117
Number of last one issued	3,230
Journeymen:	
Certificate holders	498
Licenses year ending May 1, 1923	7,066
Number of last Journeyman license issued up to Aug. 1, 1923	7,105
Number of last one issued	7,183

DAVID CRAIG, *Clerk.*

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MASSACHUSETTS STATISTICS FOR 1924.

Estimated population	4,003,030
Death rate per 1,000 population	12.4
Infant mortality	67.8 per 1,000 live births

The Commonwealth of Massachusetts

DEPARTMENT OF PUBLIC HEALTH,
BOSTON, January 21, 1925.

To the General Court of Massachusetts.

In accordance with the provisions of section 32 of chapter 30 of the General Laws I have the honor to submit herewith the annual report of the Department of Public Health for the year ended November 30, 1924.

Respectfully,

EUGENE R. KELLEY,
Commissioner of Public Health.

TENTH ANNUAL REPORT

OF THE

DEPARTMENT OF PUBLIC HEALTH OF MASSACHUSETTS

REPORT OF THE PUBLIC HEALTH COUNCIL.

For the fiscal year ended November 30, 1924, the State Department of Public Health was constituted as follows:

Commissioner of Public Health EUGENE R. KELLEY, M.D.

PUBLIC HEALTH COUNCIL.

EUGENE R. KELLEY, M.D., *Chairman.*

RICHARD P. STRONG, M.D., 1926.

WARREN C. JEWETT, 1925.

JAMES L. TIGHE, B.A.Sc., C.E., 1926.

SYLVESTER E. RYAN, M.D., 1925.

ROGER I. LEE, M.D., 1927.

J. E. LAMOUREUX, M.D., 1924.¹

FRANCIS H. LALLY, M.D., 1927.²

During the year seventeen formal meetings of the Department were held as well as many meetings of standing committees and special boards. The standing committees of the Council are as follows:

SANITARY ENGINEERING (INCLUDING HOUSING AND RURAL HYGIENE).

Mr. Tighe, Dr. Kelley and Mr. Jewett.

PREVENTIVE MEDICINE AND HYGIENE.

Drs. Lee, Kelley, Lally, Ryan and Strong.

FOOD AND DRUGS.

Drs. Lally and Ryan and Mr. Jewett.

LABORATORY WORK AND RESEARCH.

Drs. Strong and Kelley and Mr. Tighe.

PUBLICATIONS.

Drs. Lally and Ryan and Mr. Tighe.

In accordance with its usual custom the Committee on Sanitary Engineering has met regularly prior to the meeting of the Public Health Council and considered in detail all matters coming before the Department having to do with water supplies, sewage disposal and sanitation generally, subsequently submitting recommendations thereon to the Public Health Council. At the call of the Commissioner the Committee on Preventive Medicine has met at intervals during the year to consider questions of policy relative to the Department's program for maternal and infant hygiene, for laboratory research, for venereal disease control and various other subjects in the field of preventive medicine as they have come before the Department for consideration. The policy of referring technical and special matters requiring Council action to the Committees of the Council is both satisfactory as to results and increasingly necessary to ensure sufficiently detailed consideration of all phases of projects and proposals prior to formal action by the Public Health Council thereon. It also operates as an economy of time for the Council members.

As provided by statute the Public Health Council has held hearings on plans for water supplies, sewage disposal systems and contracts pertaining to the use of county tuberculosis hospitals, on proposed regulations of the Department, has considered and approved appointments submitted to it by the Commissioner as required by law, and has discharged other miscellaneous statutory duties.

From time to time the Commissioner has also submitted to the council for its consideration and advice proposed developments in policy and extensions of activity in the various fields of public health effort with which the Department concerns itself, especially in the control of tuberculosis and venereal disease, in maternal and infant hygiene and in the new field of health education.

¹ Declined reappointment for term beginning May 1, 1924.

² Appointed May 1, 1924.

The Public Health Council with the Commissioner has served during the past year as a joint board with the Gloucester Board of Sewerage Survey for the purpose of considering methods of sewage disposal for the city of Gloucester as directed by Chapter 13 of the Resolves of 1924, and has submitted a report thereon with recommendations for legislation. In this report published as a separate document will be found a full account of the study made.

Under Chapter 61 of the Resolves of 1924 the Public Health Council and the Commissioner are serving as a joint board with the Lawrence Committee on New Water Supply and the Methuen Water Commissioners to study sources of water supply for Lawrence and Methuen. This study is now in process and a report thereon with legislative recommendations will be submitted on March 21st.

In accordance with Chapter 269 of the Acts of 1924 there has also been carried on an investigation as to the sources of pollution of the Concord River, a report on this subject having been submitted to the Legislature, which will be printed as a separate document.

Two of the members of the Public Health Council have served on the special board appointed by the Commissioner to investigate and report upon "Certain Problems connected with the Maintenance of Proper Health and Medical Service in Sparsely Settled Districts" as directed by Chapter 59 of the Resolves of 1924. The report of this Board has been approved and adopted by the Department and is being published as a separate document.

At a meeting of the Public Health Council on February 10, 1925, the Commissioner of Public Health presented to the Council a report of the activities of the Department for the fiscal year 1924, together with recommendations for legislation, and it was voted that this report, together with the foregoing brief summary of the doings of the Public Health Council, be approved and adopted as the report of the State Department of Public Health for the year 1924.

TENTH ANNUAL REPORT OF THE COMMISSIONER OF PUBLIC HEALTH.

To the Public Health Council:

GENTLEMEN: — I have the honor to submit herewith my annual report for the fiscal year ending November 30, 1924.

DISEASE PREVALENCE.

Under this general subject I will discuss the trends of the principal infectious diseases as to prevalence and fatality during the past year and also certain other diseases and conditions affecting human life and health which are of significance in any general appraisal of the state of the public health, even though these latter groups are not in many respects as directly susceptible to amelioration or prevention by recognized public health procedures as are most of the diseases commonly grouped as infectious or communicable.

All statements herein include of course estimates for the last few weeks of the year inasmuch as final statistics of morbidity and fatality are not available at the date when this report must be submitted to the incoming legislature, but in the reports of the several divisions of the Department as finally printed in the supplement all statistics will have been correctly tabulated for the entire calendar year.

According to press accounts of estimates issued by various authorities on vital statistics based on estimates of the first ten months of 1924 many cities in this country are finding certain communicable diseases to be more prevalent and causing more fatalities than was the case in 1923. Happily for this Commonwealth the returns for deaths, based on a period so nearly approximating the entire year that no change of any consequence is apt to be made by the returns for the last few weeks of the year, indicate that in no single disease of a communicable nature having a general year after year prevalence of any magnitude will the deaths for 1924 exceed those in 1923.

In some diseases the returns indicate substantially the same death rate as last year; in some the reduction has been relatively slight; but in certain others the reduction is so pronounced as to be spectacular. For the entire group of diseases reported under our statutes and the requirements of this Department as "Dis-

eases Dangerous to the Public Health" there are approximately 1,169 less cases or a reduction in rate of 16.5 per cent for 1924 compared with the year 1923.

To refer individually to a few of the most serious and interesting diseases in this group:

Typhoid Fever. — Last year it was noted that for two successive years both the number of cases and number of deaths had established new low records for this disease and that for the first time on record the total number of deaths, only 70 in all, brought the death rate per 100,000 of population below 1.8, a rate never before established except in one or two instances in the entire country. This year it is certain that the total number of cases will be still less than for 1923 but the death rate will be practically identical.

Tuberculosis. — For several years past the decline in the death rate from this disease has been consistent and steady. I have several times in various reports sounded a note of caution that we have no right to expect this decline to occur without fail every year, as all past records of tuberculosis deaths show that from time to time there occurs a single year or a brief succession of years in which the death rate after remaining stationary shows a rise before again resuming its downward swing. The death rate from this cause for 1924 is 74. per 100,000 population as against 77.1 in 1923.

Scarlet Fever. — This disease has continued the unusually high prevalence noted throughout the previous year. Nearly 15,000 cases have been reported to the Department in 1924, exceeding by 3,000 cases the number reported for 1923, the largest number by a considerable margin ever reported up to that time. Fortunately, however, the disease has continued to be of an unusually mild type, so that the total fatalities are almost precisely the same as for the past two years, approximately 150 in number. There is no means of knowing when the disease may manifest a much more severe character, however, and no measures should be overlooked which will lead to the better control of the mild and unknown cases which spread infection.

Anterior Poliomyelitis (Infantile Paralysis) and epidemic cerebro-spinal meningitis show extremely low death rates compared with previous rates although in the case of infantile paralysis there is a sharp increase in the number of cases over last year.

Diphtheria, influenza, lobar pneumonia, measles and whooping cough all show marked declines in both prevalence and fatality during 1924.

In the case of diphtheria this means not only one of the lowest number of cases reported in many years, but of even greater encouragement and significance when we reflect upon the spread of the active immunization campaign against this justly dreaded disease that has been vigorously fostered by the health authorities and medical profession of this State for the past few years, is the fact that this year's rate of approximately 500 deaths establishes a new low record of approximately 13 deaths per 100,000 of population, distinctly below the rate of last year which in turn was the lowest prior to that time and, moreover, reduces the total number of deaths to a point where it is necessary to go back to the year 1912, when the total population was practically 500,000 less than it is today, to equal the record.

Influenza, with a relatively heavy death toll of over 700 during 1923 has this year dropped to an almost negligible position as regards both frequency and fatality. The total number of cases reported, less than 400 in all, is in curious contrast with our records reaching annually into the thousands practically each year since influenza was made reportable, and the total deaths have dropped to about the number returned under this heading in the average year prior to the epidemic in 1918. We have nothing upon which to hazard even a surmise as to the trend of this disease in the coming year. Sanitary science can in this instance lay no claim to credit for this year's fortunate record.

Lobar Pneumonia shows a drop in prevalence of no great extent over last year but the decline in fatality is remarkable. This is particularly interesting because the death rate from this disease for the two years just previous had been practically constant and represented a sharp increase over 1921 when the drop in deaths

over all previous records had been little less than phenomenal. Yet the death rate for this year is practically the same as for 1921. This is a good showing and one from which it appears that even if no *specific* for pneumonia has yet been discovered, the accumulated teaching of better personal hygiene and of more rational ideas among the masses as to ventilation and clothing and more outdoor exercise during the winter is having a beneficial result and is beginning to be reflected in a lowered mortality rate for this justly dreaded disease.

Measles parallels the phenomenal showing of lobar pneumonia. There have been a few previous years when with much smaller populations the actual number of measles deaths has been as low as this year but never before has such a low specific death rate for this disease been experienced as this year's rate of approximately 4 per 100,000.

Whooping Cough.—For this disease there has also been reported one of the lowest number of cases for the year since our record began to be anything like a reflection of the true incidence of this disease. Still more noticeable, however, is the low number of deaths recorded for this disease in the history of the Commonwealth, approximately 155, it being necessary to go back as far as 1904 when the population was considerably less than it is today in order to match this showing.

Diarrhea and Enteritis of young children under two years of age are nowhere reported in life but the study through many successive years of the records of death returns from this cause is of great interest as they are a good index of the sanitary progress and intelligence of a community.

The progress that Massachusetts has made in conquering this former great cause of death among our infant population has been most striking. For years from 1875 to 1894 inclusive, the average annual death rate from this cause had varied but little, being between 140 and 150 per 100,000 of population. In the decade from 1895 to 1904 this average rate declined to 116, and for the decade 1905 to 1914 to 88. The four years 1915, 1916, 1917 and 1918 saw a slight decline, each of the four years recording a rate between 60 and 70.

Ever since 1918 the decline has been striking, the rate being successively for the years 1918 to 1924 as follows per 100,000 population: 40, 43, 34, 27, 22 and 19.

Seldom has any array of successive figures meant as much in terms of young life preserved for adult enjoyment, of sparing grief of parents over loss of their babies, or, as testimonial to the steadily onward march of modern preventive medicine towards its goal of the abolition of all needless and preventable human sickness and death.

Our Massachusetts system of handling returns of births is such that we cannot make any adequate estimate at this time as to the general infant mortality rate of the year, but indications are that there will probably be no increase and very possibly a further decrease in the death rate from this cause.

After setting forth these encouraging records in the field of communicable disease and infant hygiene, it is salutary though far from pleasant briefly to consider certain other phases of our mortality experience for the Commonwealth which do not present any such assuring picture, but which must be looked upon as of grave public concern and in some instances almost as an accusation as regards the quality of our civilization insofar as it purports to guarantee to each citizen the right to "life, liberty and pursuit of happiness".

In general it may be said that such causes of death as organic heart disease, nephritis and apoplexy, colloquially referred to as the "wear and tear" group of diseases, or the degenerative diseases of middle life, show a startling growth in rate during the past twenty years, with practically no signs indicative of any reduction in the mortality or fatality from these conditions. It is true that for the current year 1924 the death rate for organic heart disease will probably be very much lower than has been the case for the three years just preceding and the record for nephritis somewhat better for the last four years as a group than for the preceding six years as a group, but taken together these three diseases have shown an increase in fatality in recent years that is little short of appalling even when all possible allowance is made for improved statistical practice and more exact diagnosis on death certificates.

It is significant that in the case of heart disease the annual death rate per 100,000

of population in recent years is substantially double the rate of the decade of 1875 to 1884, and in the case of apoplexy almost exactly three times the corresponding rate for the decade 1875 to 1884.

Cancer.—Still more appalling is the cancer record. This disease has been mounting steadily as a cause of death for several years past and 1924 is no exception. The specific death rate from this cause for 1924 will be substantially higher than any previous year. On our estimated rate (based on returns for five-sixths of the year) there will be for the first time over 5,000 deaths from this cause, making a rate of 125 per 100,000, with the record of recent years showing successively a distinct increase over seven of the past ten years and in the three remaining years showing no decline but merely repeating the records of some of the previous years.

Auto Accidents and Alcoholism.—And finally I wish to call attention to the record of auto accidents and alcoholism which may be conservatively characterized as shocking and scandalous for two causes of deaths which in theory should be largely or totally preventable, though neither are in the category of preventable diseases as that term is commonly employed.

The association of these two causes of death in the present instance is due to their striking statistical parallel in our death tables and is not being employed in a "cause and effect" sense, significant though the deduction that could legitimately be made from that angle might be. I merely wish to emphasize the fact that deaths returned as *directly* due to alcoholism, after showing a very pronounced decline in the years 1918, 1919, 1920 and 1921, when they became lower than the deaths from typhoid fever for instance (an average death rate per 100,000 population for the four years of 2.2) in 1922 suddenly shot up again to a rate of 6 per 100,000 population. It is necessary to go back over twenty years to match the high rates for the last two years, 1923 and 1924, when the death rate has been substantially the same, 7 per 100,000 and about 280 in number.

Auto accidents as a cause of death were not segregated from other causes of accidental death until relatively recent years, but with the exception of slight improvements in the years 1920 and 1921 and 1922, when the rate remained about stationary, each year has seen an increase in the number of deaths from this cause. It is also important to bear in mind that under rules of statistical procedure in classification of deaths from accidents due to collision of two different types of moving vehicles, the death is always charged to the heavier vehicle, hence auto accidents at railroad crossings resulting in fatalities are usually classified among deaths due to railroad accidents and not among auto accidents.

At the present indicated rate our total death roll from auto accidents even with this misleading feature of classification tending to minimize the true picture, will be approximately 17 per 100,000 population or in the vicinity of 700 for 1924.

THE TUBERCULOSIS PREVENTION CAMPAIGN IN CHILDREN.

In my last annual report prominence was given to the proposal of the Department for the inauguration of a systematic campaign for the prevention of tuberculosis by the examination of certain exposed and susceptible groups of school children. The legislature, after having submitted to it the proposed plan of the Department for systematically carrying out this type of work over a ten-year period, approved the general outline of the scheme and appropriated the necessary money to inaugurate the first year's work. More careful study of the prospective results of such examinations carried out gradually on a State-wide scale based upon the work already done, shows that additional institutional space will probably be needed for the care of children found by these examinations to be definitely in need of prolonged institutional care. As a result the Department is making recommendations for certain institutional modifications and enlargements which will be discussed more in detail under the topic of the sanatoria.

The fundamental principle upon which this campaign is being carried out is the selection from among the general school population of those children who are markedly below par physically as shown by their general nutrition and pronounced failure to maintain the proper ratio of height and weight for the average of their age, together with all children, regardless of their apparent physical condition, who were found to be directly exposed in their families to known cases of adult

tuberculosis of the lungs. Notice was sent to all cities and towns of the Commonwealth that this service providing expert examination of children of these groups was to be available and that the Department would carry out its policy of conducting clinics in cities and towns taking into consideration these two fundamental points: (1) the order of receipt by the Department of requests or applications for such examinations from both the school and health authorities of the city or town; and (2) availability of local resources for providing special care and attention to those children found to need careful supervision as a result of the examination clinics, preference being given to those communities best equipped with such facilities.

Response to this offer has been surprisingly spontaneous and prompt. Requests for the service have been and are still being filed with the Department from interested cities and towns. There are already more than sufficient such requests on hand to keep the present clinic staff fully occupied for much more than the forthcoming year. The method of handling the clinics has been carefully worked out and consists, if the present plan is to be continued, in having distinct clinic units, but for the present school year operating but one unit. If the plan develops as anticipated and financial support is forthcoming from the Legislature, it is hoped to put into the field two such clinic units for the next school year and possibly three the third or following year. By the end of the third year the State will have been covered once fairly thoroughly and then it will be necessary to continue for some time examinations of fresh accessions to the school population and to carry on re-examinations. The re-examination clinics will be a prominent feature of the plan of procedure.

The chief objective of the first examination will be to find those children already so affected with the disease as to require institutional care and those children showing evidence which marks them as particularly susceptible to tuberculous disease and to recommend to the parents, family physicians and local authorities either institutional care or such general lines of hygienic, medical, and nutritional procedure as will best tend to bring these children up to the normal average of health and physique. Several months after the first examination the examiners will systematically return for the purpose of making a re-examination of the children grouped as suspicious and at that time most of the final definite diagnoses of actual hilum tuberculosis will be made.

The present clinic unit is operating under the direction of Dr. Henry D. Chadwick, Superintendent of the Westfield State Sanatorium for children at Westfield, who has largely developed the technique and method of procedure in handling cases of incipient tuberculosis in childhood. Dr. Chadwick has to assist him a staff of physicians, nurses, nutrition workers, and clerical assistants. Already the school population of the city of Springfield has been examined and of the town of Ware, and the clinic at the present time is operating in the city of Malden.

Interest is very keen and widespread in this new line of attack against the tuberculosis problem and the whole program gives every evidence of receiving continuing hearty encouragement from the local health and school authorities, the medical profession and the public at large.

NEW TUBERCULOSIS LEGISLATION.

Not in many years has legislation pertaining to tuberculosis been passed in such volume and affecting so radically the general policies as to tuberculosis institutional service in the Commonwealth as during the 1924 session of the Legislature. In my last annual report I summarized the principal recommendations which had just then been filed with the Committee on State Administration in reference to tuberculosis hospital policies of the Commonwealth. With some important amendments the recommendations of this recess committee were adopted by the last General Court.

(1) The Committee recommended, thereby seconding the recommendation of the Department to the Legislature a year before, that the State Sanatorium at Lakeville which has always been maintained for consumptives only should be remodeled and set aside for the care and treatment of persons suffering from other forms of tuberculosis than consumption. The steps taken for carrying out the

action of this legislation will be discussed in more detail under the heading of the State Sanatoria.

(2) The second recommendation of the Committee on State Administration was also an endorsement of the recommendation made earlier by the Department that in line with the general development of its program for the detection and prevention and early treatment of tuberculosis in children, the North Reading Sanatorium be changed from an institution for the care of adults to an institution for the care of children. It is anticipated that when the juvenile tuberculosis prevention campaign is in full swing, probably twice as many beds will be necessary for children as are now available in the children's institution at Westfield, and it is entirely possible that a somewhat larger number of beds will be necessary. After careful discussion it was decided by all concerned that no new enabling legislation was necessary for this purpose, the original legislation establishing the State sanatoria being very broad in scope, its language stating that they be constructed for the purpose of treating tuberculosis. Hence it was agreed that the Department of Public Health should submit as part of its annual budget proposal the necessary recommendation for building alterations at North Reading.

(3) Another important recommendation of the Legislative Recess Committee which was enacted as new legislation involved very radical changes in the rates of board in the State institutions. This will be discussed more in detail under the State Sanatoria.

(4) The Legislative Recess Committee also recommended and legislation was enacted providing that cities and towns furnishing adequate hospital facilities may continue to do so providing they conform to standards established by this Department, but upon failure to do so, however, such cities and towns automatically become part of the county hospital district.

(5) Legislation was passed upon recommendation of the Legislative Recess Committee providing for the discontinuance of existing municipal hospitals in Essex County and making all of the cities within that county a part of the Essex County Hospital District.

(6) Legislation was also passed amending the laws relative to the maintenance of tuberculosis dispensaries. Formerly the law was mandatory, requiring that every town of more than 10,000 population maintain a municipal tuberculosis dispensary. The present law provides that this mandatory feature is effective only in the case of cities of 50,000 or over, and that communities of less than 50,000 shall be required to maintain such a municipal tuberculosis dispensary only upon the request of the Department of Public Health stating that in the opinion of the Department the public health requires the maintenance of such a dispensary in the case of such city or town.

(7) Legislation was passed extending to September, 1925, the time when county commissioners must comply with the statutes relative to providing facilities for the care and treatment of tuberculosis and providing further that counties may have an additional method to those already existing for compliance with this legislation by contracting with one of the four State tuberculosis hospitals to furnish such care.

TUBERCULOSIS SANATORIA.

As can easily be inferred from the matters discussed under the last two headings the past year has been one of unusual activity in settling the problems and planning for new lines of work affecting the four tuberculosis sanatoria maintained by the State under the general scheme of tuberculosis hospitalization as outlined.

Based on a general outline by the Department in its report to the Legislature two years ago, modified in certain particulars by the report of the Recess Committee of the Legislature on State Administration at the last session of the Legislature and by the enactments made in line with the recommendations of this Committee, if plans as now contemplated are carried out, the State will be maintaining in the near future instead of what was originally four institutions for the care and treatment of consumption in adults only, one institution at Rutland for this original purpose, two institutions, one at Westfield and one at North Reading, for the care of children and adolescents suffering from early tuberculosis, and one institution

at Lakeville for the care of both children and adults suffering from bone, joint, gland, and skin types of tuberculosis.

As a result of its extended tuberculosis policy the Department recommended and the Legislature authorized an addition of forty beds to be made available by the remodeling and enlargement of existing wards at the Westfield Sanatorium. This raises the capacity of the institution to approximately 300. The Department submitted this year plans for the immediate erection of an additional wing to the school building of the plant at Westfield. This addition will not only provide needed schoolroom facilities to match the enlargement of the institution but will provide space enough for an additional 100 beds which it is almost certain will be required in the next few years. This new construction will also provide dormitory facilities for the teachers at the sanatorium school; and in the basement there will be ample fireproof, airy, well-lighted files where all the permanent history records of the examinations made of school children throughout the State can be kept, studied, analyzed, and checked up against subsequent history of these children as to tuberculosis. Here also all the large number of X-Ray films taken of these same children can be thoroughly catalogued, indexed, and kept available for future study and research.

Such a scheme on such a wide scale for the study of the physical condition of those groups of children most threatened by this disease has never before been attempted so far as is known, and it ought to prove extremely valuable and interesting not only in the way of medical research but from the practical standpoint of checking up the value of present methods for the control of tuberculosis and in furnishing tremendously important clues for the formulation of the soundest possible tuberculosis policy for the State.

With these enlargements, present and proposed, it is now believed that the Westfield plant should be considered as complete.

In the case of North Reading, recommendations and plans have already been filed with the Budget Commissioner for the erection of the first units of a comprehensive scheme of enlargement drawn up by the Department's architect, the most essential of which is at present the erection of a separate building with schoolrooms on the first floor and with dormitory facilities for female employees on the second floor. If the future development of the clinics being carried on for the detection of juvenile tuberculosis indicates a necessity for it, considerable enlargement, practically doubling the present capacity of the North Reading institution, is already being considered but for the present it is recommended that only the most essential units of new building for this institution be carried out this year.

The most radical changes both in function and in alteration of existing institutions involved in the tuberculosis program adopted by the last Legislature affect the institution at Lakeville. In its closing days the Legislature passed an act setting aside the Lakeville State Sanatorium as an institution for the treatment of so-called non-pulmonary types of the disease. This department recommended that this be done upon the basis which has proven so successful in many other institutions, that is, the intensive application of the principle of helio-therapy, so-called, which is in effect the carefully adjusted exposure of the entire body to the direct rays of the sun. As utilization of the existing plant for this purpose would involve extensive remodeling (1) to allow certain wards to be made available for children, and (2) to make the necessary structural adjustment to insure complete privacy for patients undertaking the sun bath treatment, the Legislature approved the general plan for this institution and passed an appropriation bill enabling the preliminary remodeling to be undertaken this year, with the understanding that the Department should file complete plans for the necessary alterations and remodeling in the present structure to be carried out the coming year. This has now been done.

As part of the legislation already referred to, the Legislature provided an additional appropriation to permit certain remodeling of existing buildings for dormitory purposes at Lakeville. This work has been carried out expeditiously and the dormitory is now available. Plans have been filed with the Budget Commissioner providing for the entire remodeling of this institution along the lines above indicated and it is confidently expected that the Legislature will make the necessary

financial provision for carrying out these plans and the work will be done in large part during the coming fiscal year. Because of the difficulty of doing extensive remodeling of institutions where patients are still being housed, it is in fact quite certain that all the contemplated remodeling cannot be carried out during the coming year, certain parts of which may well be postponed until the following fiscal year.

At the end of this time it is anticipated that the entire institution will be remodeled for the purpose of giving helio-therapy treatment in its most highly specialized and developed form. The results at other institutions have been so encouraging as to this method of treatment in recent years that there can be no question that the institution on its new basis will be of immense service to the sufferers from these types of tuberculosis and will be a great factor in improving the state of the general public health.

While no radical change in functions and class of patients to be accommodated is planned for the State Sanatorium at Rutland, the recently enacted laws bearing upon the rates of board at the State sanatoria and amending the previous provisions of the law relative to permitting the care of consumptives by counties, will undoubtedly have a profound bearing upon the future of the Rutland Sanatorium.

The rate of board of patients at the State sanatoria has now been raised from \$4 to \$7 per week, effective December 1, 1925. This legislation provided that while the rate of \$7 should be maintained for children and for all persons paying their own board from private sources, in the case of all patients supported by cities and towns the amount of board should be not less than the actual cost to the Commonwealth.

By another piece of legislation enacted and previously referred to, provision was also made amending the previous existing law permitting county authorities to comply with the county tuberculosis hospital law by making a contract with some adjoining county in lieu of building an institution of their own. The new amendment provided that such a contract might be made not only with an adjoining county but with any county or with a State institution.

It is difficult to state just what the effect will be upon the State institution at Rutland of these two pieces of legislation when the policy of setting aside Lakeville and North Reading for certain types of cases is fully worked out. With reference to the general situation the result will probably be that a much less number of adult consumptive patients will be supported in State institutions by cities and towns which are already members of the county hospital districts or have their own municipal tuberculosis hospitals. At any rate it seems a safe conclusion that the total amount of revenue to the State from the maintenance of tuberculosis hospitals should be markedly increased in the future. The adjustment of rates for board is only fair inasmuch as this rate has never been changed since the passage of the original act creating the Rutland Sanatorium in 1898, although the cost of maintenance has increased over 100 per cent since that time.

All the State sanatoria have been continuously filled to capacity and much beyond. The waiting list has fluctuated from 50 to nearly 200 at various times, but there has always been a considerable waiting list, especially for children and women.

Following the resignation of Dr. Sumner Coolidge, Superintendent of the Lakeville State Sanatorium, on April 24th, Dr. Leon A. Alley, Assistant Superintendent at Rutland, was appointed Superintendent of this institution, effective August 2, 1924. Dr. Alley has already had considerable experience not only as Assistant Superintendent but on two occasions as Acting Superintendent of the Rutland Sanatorium, and entered upon his new duties well qualified for sanatorium management.

In general, the policy of the Department in recent years relative to care and treatment of patients at the sanatoria has been to insist upon a greater amount of rest and increasingly carefully checked medical supervision of every detail of the patients' daily life, and it is the conviction of the staffs of the institutions and officials of the Department that this policy has led to very much more satisfactory results than the earlier form of treatment.

Additional information as to the sanatoria will be found in the report of the Division of Tuberculosis (Sanatoria).

LABORATORY NEEDS.

In my last annual report attention was called to the fact that the so-called Schick test for susceptibility to diphtheria and the accompanying procedure of establishing active immunization in those susceptible to the disease by the use of toxin-antitoxin, could be considered as well beyond the experimental stage, the results of the application thereof by this Department on a very wide scale having been uniformly satisfactory and encouraging. Throughout the year just past there has been great activity on the part of the medical profession in general in the State, and more particularly by the health and school authorities of many municipalities and towns, in the furthering and popularizing of this method of disease prevention. This has resulted in a continuing increase in the demand upon the Antitoxin and Vaccine Laboratory for the product with the result that the available space in the laboratory at Forest Hills has been stretched to a point where by no further readjustments can any material increase in the quantity of output be brought about.

Moreover, at the present time there is a great deal of acute interest in procedures for the control of scarlet fever somewhat analogous to the established method for preventing diphtheria by artificial immunization. While the various sera and vaccines for scarlet fever which are being developed experimentally cannot be said to be established in the same degree as the toxin-antitoxin method for immunization against diphtheria, yet they are most promising and the probabilities are that in a short time these procedures will become thoroughly standardized and the State should be able to supply them for the benefit of the public. As may be seen more in detail by reference to the report of the Division of Biologic Laboratories, since the year 1919 there has been an increase of practically 160 per cent in the amount of diphtheria antitoxin distributed, each year showing a substantial increase over the previous year, and the distribution of the material for testing susceptibility to diphtheria has risen from practically nothing to a considerable amount, but the most extraordinary showing of all has been the rapid growth in the amount of material put out for active immunization against diphtheria, — the toxin-antitoxin mixture, — an increase from less than 2,000 doses in 1919 to 309,000 in the current year. Only the most careful planning and use of available laboratory space has made this record possible, but the laboratory has unquestionably reached the limit of expansion in its present quarters.

Shortly after the reorganization of the State Board of Health in 1915, the inadequacy of laboratory space began to be apparent, and in each of the first four reports of this Department attention was called to the need of a new laboratory and to the fact that the authorities of Harvard University from whom the Department leases the present laboratory buildings desired to use such buildings for university purposes. In 1919 this matter was vigorously agitated and the recommendation made in the estimates for the purchase of a new site and sufficient money to erect a new laboratory with the necessary stables for the keeping of the animals. Consideration of cost, particularly in the ever-multiplying demands which were thrust upon the public service as a result of the war, the lessened buying power of the dollar, and the excessively high cost of building, resulted in a postponement of the matter that year, and the situation has remained substantially the same to the present time.

It would seem quite possible now that some arrangement might be made with the Harvard authorities whereby either the present premises might be taken over by the Commonwealth under eminent domain procedures or some satisfactory and mutually fair long-term lease entered into under which the Commonwealth would be justified in adding to the present plant at Forest Hills. There is no question whatever as to the great advantages which the present location possesses over any others that have been considered by the Department in the past, but the present space has become totally inadequate.

Whatever policy is finally determined upon, it is also necessary to consider seriously the question of the advisability of transferring all or nearly all of the laboratory activities now carried on by this Department in the State House to the new laboratory center. State House space is urgently needed for other purposes,

and in many ways laboratory activities are unsatisfactorily located in a building of the general character of the State House.

No specific recommendation is being made at the present moment by the Department concerning this important matter. The Antitoxin and Vaccine Laboratory can function efficiently on the present quantity of output for a short space of time longer but within the next two or three years it will either be necessary (1) for new and more adequate facilities to be supplied; or (2) for the Department to curtail very markedly its activities in the field of production and distribution of biologic products; or, as a third alternative, for the Commonwealth to withdraw entirely from the field of the manufacture and distribution of biologic products and rely upon purchases from commercial laboratories producing these products. Such a backward policy would undoubtedly arouse the strongest protest from the medical profession and the people of the State generally. It is my strong conviction that the needs of the public service can be most satisfactorily and economically met by making it possible for the Department to continue the manufacture of its own biologics and to permit this that some adjustment be made with Harvard University which will permit a reasonable expansion of the present laboratory facilities at Forest Hills. I do not believe that the authorities of the University would stand in the way of the furthering of such a definite public service as some fair arrangement on this basis would make possible.

TECHNICAL PUBLIC HEALTH EDUCATION.

In recent annual reports considerable attention has been directed to the ever-present and always difficult problem of how a health department can best fulfill its now universally admitted duty of furnishing to the public instruction in the fundamentals of disease prevention and health preservation.

The impossibility of ever getting adequate returns from indiscriminate broadcasting of lectures and special literature to the general public has been increasingly recognized. The field of appeal through the daily press and periodics while of much value is necessarily limited. The importance of teaching the principles of public and personal hygiene through the school system, elementary, advanced, and technical, has become increasingly clear as time goes on. Through no other channel can health education be so well applied and such good return be demonstrated for any like expenditure of effort and funds, and in recent years this Department has increasingly directed its efforts along these lines.

Enough has been said relative to health education in elementary schools in these reports and in public health literature generally so that any additional discussion of that theme here would be trite, but the very great contribution that health departments can make in this field by establishing proper lines of contact, co-operation, and affiliation with student groups enrolled in advanced institutions and particularly in certain technical institutions has not been sufficiently emphasized.

When a health department clearly describes to such student and teaching groups its purposes and manner of functioning and its opportunities for service to the general tax payer, the indirect influence is bound to be cumulative and far-reaching. By this method it is making generally known and "selling" the conception of the value of its services to the public welfare to these very groups who through the special opportunities afforded by their training and life work as teachers and leaders can and will pass along these instructive, life saving, and health promoting truths to their fellow citizens.

It is, therefore, gratifying to be able to record that gradually and as part of the routine work of the Department valuable contacts of this type have been made with several educational institutions of the Commonwealth. Of special note is the excellent co-operation between this Department and the State Department of Education concerning the development of school hygiene work through the State. As a part of this joint endeavor a short course for the supplemental training of school nurses in the technique of their specialty was inaugurated as part of the course of instruction offered last year at the Summer School of the State Normal School at Hyannis. There was a relatively heavy enrollment of the school nurses of the State and both they and the educational authorities were most enthusiastic over the value and practicability of this course, instruction being given jointly by

two members of the staff of this Department and by the faculty of the Normal School. This type of course will be repeated and extended during the forthcoming session.

Of a still different type of health education are the lectures on the work of the Department in general or on special phases of health department work given regularly to a considerable variety of institutions, universities, normal schools, nurses' training schools, etc.

Another affiliation that is proving of great mutual value is the active participation of many members of the staff of the Department in the practical teaching of the School of Public Health of Harvard University and the School of Public Health Nursing of Simmons College.

The New England Health Institute, planned and carried out on the principle of a short intensive graduate school rather than on the usual conference lines, for the benefit of health officials and professional workers in various fields of public health endeavor, seems now to be fairly well established as a permanent annual feature for New England. The first session held in Connecticut was largely attended and received with enthusiasm by *professional* health workers. The second held in Boston early in May of this year was even more enthusiastically attended by the special groups it was designed to serve. The course aroused much public interest as well as was reflected in the space given to it by the daily press of Boston and other New England cities. A full account of this Institute will be found in the appended report of the Division of Hygiene.

The authorities of Tufts Medical School have arranged each year recently to have their third year medical class come in a body to the State House for a half day at which time the activities and methods of functioning of the Department in general and its several divisions are briefly set forth by the Commissioner and Division Directors. On a somewhat less formal and more individual or small group basis, similar demonstrations are carried out as part of the regular course of instruction for students of the Department of Biology and Public Health of the Massachusetts Institute of Technology and the Boston School of Social Work.

Graduate students, particularly of the Harvard Medical and Public Health Schools are being utilized more each year on a voluntary assistant basis in the laboratories and field work of this Department.

FOOD AND DRUG CONTROL.

The past year has witnessed several interesting developments in the Food and Drug control activities of the Department.

Two laws were enacted by the last legislature placing new duties and additional activities upon this division. The first was the so-called sanitary food law which for the first time established on a *state-wide* basis the power to insist upon any uniform or even minimum standards of cleanliness in the handling and the surroundings of food products during process of manufacture. This law is very brief and neither attempts to fix standards of what shall be deemed "sanitary" surroundings as applicable to various food manufacturing or processing establishments, nor gives this Department or any local health boards authority specifically to fix such standards. The law is to be enforced by actions brought for violation of its provisions by the inspectors of this Department or of any local board of health or by any citizen of the State on his own initiative.

This means that only slowly and by court decisions will the general line of policy and procedure be developed under this law, and standards will thereby be gradually established so that reasonable enforcement proceedings will eventually be easily carried out.

The other new law defines and establishes Grade A pasteurized milk, supplementing the statute passed a few years ago establishing standards for Grade A milk raw. Under the provisions of this law it became the duty of this Department to draw up rules and regulations defining the conditions under which milk may be offered for sale as Massachusetts Grade A milk pasteurized. Numerous conferences were held by the Director of the Food and Drug Division with the local milk inspectors and representatives of the milk industry. Guided by opinions and suggestions elicited by these conferences the Department following a public adver-

tised hearing as provided by statute established rules and regulations for Grade A milk which have been approved by the Governor and Council. Under these carefully drawn provisions a supply of strictly fresh thoroughly safeguarded milk from a health view will be made available. This point is of greatest significance in the care of infants and invalids and such milk will also be sought by many for general use. Moreover, under the law, producers wishing to put out a superior product can obtain the higher price that is their due without any adverse effect upon the economics of the production of market milk of the ordinary grades.

CHANGES IN ORGANIZATION AND PERSONNEL.

Reference was made in the last annual report to the resignation of the Director of the Division of Communicable Diseases and Deputy Commissioner, Dr. Bernard W. Carey, effective January 1, 1924. He was succeeded on March 1st by Dr. George H. Bigelow. Under Dr. Bigelow's able direction the epidemiological activities of the Department have been maintained at their previous high standards and several rearrangements of the internal organization of the Division have been brought about which I believe will result in increased economy of operation without any loss of efficiency.

The most important change in the organization of the Department has been the abolition of the Subdivision of Venereal Diseases and the transfer of its functions and staff to the Communicable Disease Division, which change went into effect simultaneously with the resignation from the Department of the Chief of the Venereal Disease Subdivision, Dr. Albert Pfeiffer, who accepted a similar position with the New York State Department of Health. As a result of this change it has also been possible to eliminate two positions on the clerical staff.

Dr. Charles W. Milliken, for six years District Health Officer of the South-eastern Health District, resigned November 30, 1924, to become Director of School Hygiene for the city of New Bedford. Dr. Richard P. MacKnight, formerly assistant physician at the Bristol County Tuberculosis Hospital at Attleboro, has been provisionally appointed District Health Officer for this District, pending the result of a competitive Departmental examination for this position.

Following the appropriation of funds by the Legislature for the inauguration of the special school clinics for the detection and prevention of juvenile tuberculosis, Dr. John I. Pinckney, was appointed Chief of Clinics, but served only until August when he resigned to accept another position. This vacancy was filled by the appointment of Dr. H. D. Chadwick, Superintendent of the Children's Sanatorium at Westfield, as Chief of Clinics on a part-time basis, Dr. Chadwick still retaining his position as superintendent but under such conditions that the assistant superintendent serves practically as acting superintendent, leaving the greater part of Dr. Chadwick's time for the clinics.

Dr. Sumner Coolidge's resignation as Superintendent of the Lakeville State Sanatorium was requested and received by the Department on April 24, 1924.

In July Mr. Merton P. Young was appointed as Assistant Director of the Division of Tuberculosis (Sanatoria) with the duty of assisting the Director and superintendents in the financial and business administration of the sanatoria.

In the membership of the Public Health Council changes have occurred as noted elsewhere. Almost at the end of the fiscal year the entire membership of the Department was shocked by the sudden death of Professor George C. Whipple, Professor of Municipal Engineering in Harvard University and a member of the Public Health Council from the time of its creation in 1914 until May, 1923.

Another change in the organization and functioning of the Department was consummated during the past year by the promotion of Miss Frances L. McCloskey, for ten years secretary to the Public Health Council, to the newly created position of Secretary of the Department with the duty of administering the Division of Administration and correlating more closely the internal administrative organization of this Department, especially the relationship of the several divisions with the Division of Administration. This change has already resulted in many distinct advances in the line of more efficient and more uniform procedure in matters pertaining to finances, personnel and internal departmental administration in general.

As at present constituted the organization of the Department is as follows:

Commissioner of Public Health Eugene R. Kelley, M.D.

PUBLIC HEALTH COUNCIL.

Eugene R. Kelley, M.D., *Chairman.*

Roger I. Lee, M.D.	Francis H. Lally, M.D.
Richard P. Strong, M.D.	Warren C. Jewett
Sylvester E. Ryan, M.D.	James L. Tighe, C.E.

Secretary of Department Frances L. McCloskey

<i>Division.</i>	<i>Administrative Head.</i>	<i>Title.</i>
Administration	Frances L. McCloskey	Secretary of Department
Communicable Diseases	George H. Bigelow, M.D.	Director and Deputy Commissioner
Sanitary Engineering	X. H. Goodnough, C.E.	Director and Chief Engineer
Water and Sewage Laboratories	H. W. Clark	Director and Chief Chemist
Food and Drugs	Hermann C. Lythgoe, S.B.	Director and Chief Analyst
Biologic Laboratories	Benjamin White, Ph.D.	Director and Pathologist
Hygiene	Merrill E. Champion, M.D.	Director
Tuberculosis (Sanatoria)	Sumner H. Remick, M.D.	Director

All these positions are on a full-time basis.

The seven District Health Officers of the Department are for administrative purposes attached to the Division of Communicable Diseases. Their names and districts follow:

First or Southeastern Health District	Dr. Richard P. MacKnight (Provisional appointment)
Second or Eastern Health District	Dr. George T. O'Donnell
Third or Northeastern Health District	Dr. Lyman A. Jones
Fourth or North Midland Health District	Dr. Charles E. Simpson
Fifth or Worcester Health District	Dr. Oscar A. Dudley
Sixth or Connecticut Valley Health District	Dr. H. E. Miner
Seventh or Berkshire Health District	Dr. Leland M. French

The following are the Superintendents of the four State Sanatoria which are under the Division of Tuberculosis (Sanatoria):

Rutland State Sanatorium	Dr. Ernest B. Emerson
Westfield State Sanatorium	Dr. Henry D. Chadwick
North Reading State Sanatorium	Dr. Carl C. MacCorison
Lakeville State Sanatorium	Dr. Leon A. Alley

The State Board of Examiners of Plumbers is also attached to this Department, the members being appointed by the Public Health Council and their rules and regulations being subject to approval by the Department. The membership of this Board at present is as follows:

Mr. Charles R. Felton of Brockton, *Chairman.*
 Mr. Frank L. Avery of Holyoke.
 Mr. David Craig of Boston, *Clerk and Executive Officer.*

SPECIAL LEGISLATIVE REPORTS AND NEW LEGISLATION RECOMMENDED.

As has been the case for several years past, the Legislature of 1924 by special resolves directed the Department of Public Health to report to the incoming Legislature on several subjects:

(1) Chapter 59 — Resolve providing for an investigation by the Department of Public Health of certain problems connected with the maintenance of proper health and medical service in sparsely settled districts.

(2) Chapter 13 — Resolve providing for an investigation relative to sewage disposal in the city of Gloucester.

(3) Chapter 269 — Act providing for an investigation by the Department of Public Health of the matter of sewerage and sewage disposal in the valley of the Concord River.

(4) Chapter 61 — Resolve providing for an investigation by the Department of Public Health, the Commission on New Water Supply of the city of Lawrence, and the Water Commissioners of the town of Methuen relative to sources of water supply for said city and town.

The subject matter of the first resolve, that of medical service in rural districts, has been agitated and discussed in this Commonwealth for several years and various proposals have been brought forward for relieving the alleged shortage of medical service in the more remote sections of the State. In accordance with the terms of the resolve, the Department appointed a special committee composed of members of the Public Health Council and the executive staff of the Department under the chairmanship of the Deputy Commissioner, Dr. Bigelow. The committee carried out a very thorough study of the actual available supply of medical, nursing, and hospital service in all the more sparsely settled portions of the State. In general the character of the investigation has been that of first-hand study upon the spot by representatives of the Department. A very complete report discussing all phases of the situation has been filed with the Legislature.

Briefly it may be said that the findings of the Department indicate that the shortage or non-availability of medical or other health service does not seem to be as serious as has been alleged from many quarters; furthermore, that there seems to be at present no satisfactory method by which the conditions can be adjusted or improved as a result of legislative action, and it was so reported. The report contains a careful discussion of the whole problem of the increasing difficulty of retaining resident medical service in the smaller towns and villages of the State under the stress of changing economic conditions and with the rapid extension of better facilities for transportation, which have had the effect of bringing the resident medical and dental practitioners of the larger towns and cities into more direct competition with the rural practitioners during most of the months of the year.

Under the terms of the second special investigation, the Public Health Council of this Department and a special sewerage commission of the city of Gloucester were constituted a special Joint Board for the purpose of studying the question of sewage collection and sewage disposal in the city of Gloucester. Careful engineering studies have been carried on throughout the summer months, and as a result a report has been drawn up in which will be offered a permanently satisfactory solution of the sewerage problem of this city. This plan is also one which can be carried out on a gradually extended basis as outlined in the report without any undue financial burden upon the city. This report, together with a draft of necessary legislation, will be filed with the incoming Legislature for such action as it may deem best.

The investigation of the sources of pollution of the Concord River concerns principally certain conditions of this river near the point where it empties into the Merrimack River. A report on this subject has been sent to the Legislature as required by this act.

The study of the water supply needs of Lawrence and Methuen is in effect designed as a supplement to a previous study on the same subject conducted by this Department in 1922. At that time all the favorable local sources of supply were studied carefully and a possible satisfactory source of supply to be used jointly with the city of Lowell was thoroughly studied. Under the resolve the Board of Water Commissioners of the town of Methuen and the Special Water Commission of the city of Lawrence, together with the Public Health Council of this Department, became a special joint board for the purpose of studying the feasibility of obtaining a new water supply for these two communities from the sources of the Metropolitan District, and the study has been prosecuted along these lines. The time since the adjournment of the Legislature has proven insufficient to complete this work and the Joint Board has requested an extension of time for the filing of this report to the 21st of March, 1925.

NEW LEGISLATION RECOMMENDED.

After careful consideration of all aspects of our public health administration and the statutes governing them, I am of the opinion that it is not advisable to recommend any radical or far-reaching changes in legislation this present year.

Experience of the past year has shown, as is almost invariably the case, certain technical defects of our present laws, and as a result the following legislation is recommended:

- (1) An Act establishing a standard of milk fat for butter.
- (2) An Act amending Section 189 of Chapter 94 of the General Laws relative to the inspection and sale of food, drugs and various articles.
- (3) An act relative to the methods of reporting to the Department of Public Health cases of certain diseases dangerous to the public health.

TEN YEARS OF PUBLIC HEALTH LOSS AND GAIN IN MASSACHUSETTS.

Because the present year marks the termination of a full decade since the reorganization of the State Board of Health of Massachusetts into the present Department of Public Health, it seems fitting to incorporate into the annual account of the state of the public health and of the Department's activities a condensed survey or comment upon certain features which have been of particular interest or significance in the public health experience of the period. While not all the experiences and records show gains in life preservation and health conservation, for the most part the balance sheet is both encouraging and instructive, and furnishes a basis for the continued development of and carrying on of a sound public health program in Massachusetts.

I. Trends in General and Specific Death Rates for Past Ten Years.

While crude death rates require careful analysis and adjustment according to age and sex distribution, effect of immigration and emigration, etc., prior to basing final conclusions thereon, the tendency of such death rates over several consecutive years and particularly of the death rates for specific diseases, are on the whole one of the most dependable as well as the simplest index of advance, stagnation or regression in public health activity.

From this angle the figures for Massachusetts for the period being considered are most encouraging. From 1875 to 1895 the general death rate from all causes and including all ages showed on the average almost no variation, there being nearly 20 deaths annually for each 1,000 living inhabitants, with a slightly higher rate during the latter of the two decades. Then the ameliorating effect of the great advances in sanitary control of environment and of the practical application of the principles of bacteriology began to be manifested in the general death rates and during the decade from 1895 to 1905 the general death rate fell to considerably less than 18 per 1,000 living persons. In the subsequent decade it again dropped to something less than 16, and in the last ten year period now under review to considerably less than 15; to be exact, to an average death rate of 14.4 per 1,000 living inhabitants. While this indicates a marked improvement over preceding periods, the figures do not become so significant until it is realized that this average rate for the period 1915 to 1925 has absorbed the extraordinary high death rate of the influenza year.

Moreover, while the annual rates in the first four years of the period were in the vicinity of 15 per thousand, for the past four years they have been consistently about 13 or slightly less. Without making any allowance for the increase in total population and leaving the fatal influenza year out of the comparison, *this means that for the last four years there have been consistently from 4,000 to 6,000 less deaths annually than for the corresponding first four years of the decade!* This one great achievement in life saving speaks for itself and needs but little comment to indicate the beneficent results of the application of preventive modern medicine and hygiene.

Certain specific causes of death as typhoid, diphtheria, pneumonia, tuberculosis, and in fact the communicable diseases as a whole, show even more startling relative gains in life prolongation. Similarly the general infant death rate and the rate from infant intestinal diseases in particular show striking reductions.

If the more serious communicable diseases of this region are considered as one group, including therein diphtheria, infantile paralysis, lobar pneumonia, epidemic meningitis, measles, scarlet fever, smallpox, tuberculosis, typhoid and whooping cough, very significant facts appear which are perhaps more truly indicative of the cumulative effect of modern preventive medicine than any observations drawn

from records of a single disease, noteworthy as these are in many instances. Thus, it appears that while the total reported prevalence of these diseases considered as one group has varied but little, save in the two years when influenza was present and when the number of cases of "pneumonia" was multiplied enormously, the total *deaths* from all these causes combined have exhibited a striking consistent downward tendency, better seen at a glance from the following table than from pages of description.

Year	Deaths	Combined Death Rate ¹
1915	9,765	263.8
1916	10,842	290.3
1917	10,558	282.8
1918 ²	17,891	470.6
1919	8,368	218.2
1920	8,665	234.0
1921	6,489	166.3
1922	6,944	176.4
1923	7,069	178.1
1924 ³	5,902	147.4

In contrast to this encouraging picture there is a group of diseases not communicable, although some of them are often influenced by previous damaging of the organs through infections in earlier life. All of this group of diseases, which develop most conspicuously in middle life, have shown a pronounced increase in fatality during the past ten years.

The most conspicuous in this group are cancer, nephritis or Bright's disease, organic heart disease, apoplexy, diabetes and alcoholism. Add to these deaths the deaths from automobile accidents at all ages and we have the principal causes of death which are showing either constantly or intermittently a tendency to increase fully as striking as the general tendency of the group of communicable diseases previously considered to decrease. Yet most of these causes are as truly preventable by closer attention to personal hygiene and adjustment of the bodily mechanism to its natural or individual limitations as the common infectious diseases as a group are susceptible to control by preventive medicine.

II. *The Growing Interest in Personal Hygiene.*

Even as if the alarm signals sounded by the statistics of the group of diseases considered in the foregoing paragraphs had already begun to penetrate into the consciousness or perhaps even more accurately it might be said into the *sub-consciousness* of the general public, it can clearly be noted as one pronounced phenomenon in the field of sanitation in Massachusetts in the past decade that the general public is beginning to consider personal hygiene with a degree of interest, intelligence and practical attention unparalleled in our history. The growing custom of periodic physical examinations, especially by middle-aged persons of sedentary occupations, the golf craze, the growing popularity of periodicals devoted to sports, physical culture, dietetics and the like, regardless of the occasional obvious charlatanry of some of these publications, indicate that one pronounced feature of the coming decade will be a thorough application by the masses of the principles of personal hygiene as a means in itself in addition to the corresponding betterment in the same direction resulting as a by-product from the increasing vogue of outdoor sports and other recreational activities. I have little doubt that this rapidly growing interest of individuals in their personal health will be soon reflected in a decline in the death rates from the so-called "degenerative" or "wear and tear" diseases of middle life.

III. *Development of Infant and Child Hygiene.*

Probably no other public health feature of the past ten years has received such impetus as the systematic promotion of infant and child hygiene. Agencies in

¹ *I.e.*, of entire group per 100,000 of population.

² Influenza year.

³ Ten months returns; twelve months estimated from preliminary reports.

school and health departments as well as agencies developed outside official channels in communities of all sizes exclusively devoted to the promotion of infant and child hygiene have become so accustomed a feature of to-day that it is difficult for those who have been actively in the midst of these developments to realize that ten years ago there were but a few school and infant hygiene nurses and that such agencies as health centers, well baby clinics, systematic nutrition teaching, and dental hygiene were either in a most rudimentary stage of development or in most instances non-existent.

Statistics for the period show the fairly consistent fall of the infant mortality rate from the average figure of 125 deaths for every 1,000 live births for the ten year period 1905 to 1915, to the present figure of around 80, maintained now for three consecutive years. This record as well as the reduction of deaths due to infant diarrhoea to a figure so low as to have seemed incredible to sanitarians of experience a few years ago, reflect the attention and effort devoted to the conservation of child life. The average yearly mortality rate of diarrhoea for the previous decade was approximately 88 per 100,000 population. The average for the ten year period just past was approximately one-half as much, or 45 per 100,000 population. Still more remarkable is the fact that the rate has steadily dropped in the past few years until now it is averaging only about 20 deaths per 100,000. This means a saving of approximately 3,500 children's lives annually on the basis of the record of 1910, the end year of the previous decade, or a reduction from approximately 4,200 deaths on the 1910 rate of fatality to 800 deaths in 1922 and 1923.

Statistics of death, however, give a quite inadequate conception of the amount of skilled and fruitful effort that has been developed for the active promotion of the health of infants and young children. The creation of the Division of Hygiene by this Department in the first year of its existence has undoubtedly been a powerful influence in this multiplication of agencies working for better conservation of child health throughout the Commonwealth, but it has been chiefly the great response of the local communities that has made possible this almost amazing growth in child saving agencies.

In reviewing the systematic work of city and town school and health departments in child hygiene, two features stand out. One is the remarkable increase in the number of school nurses employed. In 1914 there was no reliable census of nurses employed on a full or part-time basis in school health work but the most liberal estimate would not exceed 50 in number, centered in half a dozen of the largest cities. Today there are 358 such nurses, most of them on a full-time basis. Nurses employed by municipalities for systematic infant hygiene work were a distinct novelty in 1914 although some of the larger cities had started to furnish this service, largely for the purpose of checking up on the occurrence of ophthalmia neonatorum. Today there are approximately 200 such nurses employed in the State, many of them in towns of relatively small size.

During the period being considered there has been great legislative agitation within the Commonwealth over various proposals for assistance for prospective mothers by cash subsidy and by other means under the general term "Maternity Benefits." The Federal Act for the stimulation of maternity and child hygiene work in the several states on a subsidy basis has been enacted. While none of the various bills pertaining to so-called "maternity benefits" was enacted and Massachusetts has definitely refused to adopt the Federal Act, the net result of the interest raised by these legislative proposals has resulted in great stimulation of interest in the subject throughout the State, and in 1922 additional financial resources were placed at the disposal of this Department by the Legislature to encourage and promote the extension of both official and voluntary child hygiene activities in cities and towns of the State, which work has been carried out under the Division of Hygiene.

IV. The Development of the Venereal Disease Campaign.

A close second to infant and child hygiene in importance as a new line of activity by health departments has been the inauguration and gradual development during the past ten years of a program to combat and prevent venereal disease. Some sanitarians would perhaps go so far as to rate the venereal control program as of even greater fundamental racial concern than child hygiene; none probably

would contend that as yet there has been anything like corresponding progress in the field of venereal disease control, taking all social groups and all political subdivisions of the State into consideration. There are many obvious reasons why this should be so. In view of the many handicaps, traditional, religious, social, aesthetic, medical, and statistical, that continue to block the road to the consideration of this subject as a public health problem, the point of progress reached from about zero nine years ago towards the ultimate solution of effective venereal disease control is an achievement.

This organization from its inception as a Department has emphasized the significance and weight of gonorrhea and syphilis as public health questions. The first step taken was the creation of the Wassermann Laboratory in 1915, thereby making available free of charge to all, the facilities and aid of this laboratory in the baffling problem of the clinical diagnosis and treatment of syphilis. The response from the medical profession and hospitals was immediate and has ever since been increasingly manifested by the steady growth of demands on the laboratory for such examinations, the number of specimens having grown from 25,000 submitted during the first full year to over 60,000 such examinations for the year just closed.

The next move in this field by the Department was the manufacture of arsphenamine. The Legislature of 1916 on the recommendation of the Department authorized and appropriated funds for carrying out chemical research either to reproduce or to find an equally efficient product for the treatment of syphilis in place of the arsenical preparation known as "Salvarsan," then a German monopoly and unobtainable for hospitals and physicians because of the allied blockade against all German exportation. The success of the research conducted by our Food and Drug Division, the subsequent large-scale manufacture and free distribution of "arsphenamine" on a routine basis to qualified dispensaries and physicians, and the effect of this action upon other sections of the country, are now matters of history and need not be retold here.

The third step in the erection of the present structure for attacking venereal disease was the establishment of a definite system of venereal disease reporting, of State-approved treatment centers or clinics, and the inauguration of a general educational campaign, in all of which policies Massachusetts was a pioneer. This mechanism for venereal disease control became effective early in 1918, antedating Federal action along similar lines and that of nearly all other states. The onswEEP of the war led to a feverish development of venereal disease-fighting organizations throughout the land. Very considerable sums of money were for a time made available to many states far beyond the amounts that under normal conditions would have been forthcoming, under the financial stimulus of the Federal contingent subsidy to the states for this work and for social hygiene propaganda.

The hectic high tide of interest and effort in this field has naturally ebbed in the past three or four years. As a Department we have consistently striven to keep the emphasis on the communicable disease aspects of the problem and to leave the important fields of sex education in general and of public morals to those other governmental and social agencies better equipped by function and authority to handle them. I feel that time has shown the wisdom of the relatively conservative, slowly-developing program and policy of the Department in this field. We have not had to abandon any large features of the work which our experience has led us to conclude were valuable, as has been the case in many other states. The medical profession, public authorities, educators, social agencies and the leaders of religious and moral thought are, on the whole, convinced that the program of the Department is reasonably sound and progressive, and are giving splendid support. The very nature of the diseases, the notorious tendency towards concealment of syphilis and gonorrhea in life and their evasion on death certificates by the use of vague, misleading terms, together with the lack of any reliable data as to prevalence prior to 1918, prevent the making of any definite claims of progress on a statistical basis; but it is the consensus of opinion of the best qualified students and observers of the subject that a substantial and sound start has been made towards the ultimate control and eradication of these two great physical and moral scourges of the human race.

V. *Infant Blindness.*

Closely and tragically aligned with the topic just discussed, there has existed for centuries one potent cause of human misery concerning which there is ample documentary evidence to justify our claiming credit in this State for its abolition. I refer to the blindness caused by infection of the eyes of the new-born usually by the gonococcus, occasionally by other septic organisms. In 1909 the State Board of Health first began the campaign against this preventable disease in co-operation with the State Commission for the Blind. Succeeding years saw a rapid development of a same line of attack based on reporting, insistence on the routine use at birth of silver nitrate, the State-distributed preventive, and thorough investigation under the general supervision of the District Health Officers of the Department of every reported case. The result is that although this disease is estimated in the recent United States reports to have been the cause of at least one-fifth of all cases of total blindness in the country at large and of a much greater number of cases of vision so impaired as to heavily handicap the victim for life, there has not been a single case of total blindness from this cause in Massachusetts during the last six years.

VI. *The Control of Typhoid Fever.*

The remarkable diminution, close to the point of total suppression, of this once widespread infectious disease calls for certain brief comment in any review of this sort, even though the theme of typhoid as the professional sanitarian's crown of glory has been worn threadbare in the literature of the past generation.

The control of typhoid has been a definite joint objective of preventive medicine and sanitary engineering for several decades past but it is only recently that the goal began to be clearly discernible. Despite the gradual diminution in the death rate from this disease extending over a period of forty years, during the early years of the present century this State regularly had over 3,000 cases recorded, based on admittedly incomplete reports, and from 400 to 500 deaths. By 1914 this showing had been greatly improved but there were still approximately 2,000 cases and 250 deaths occurring annually. From the time of the re-organization of the State Board of Health and the placing of the District Health Officers on a full time basis, a complete detailed study of all the circumstances surrounding every reported case of the disease has been systematically carried out by the epidemiological staffs of the city health departments or by our own field staff. Simultaneously an active campaign relative to pasteurized milk and for the detection and identification of typhoid carriers has been carried out. Today the number of cases reported annually for the State is in the vicinity of 600 and the number of deaths has been dropping almost constantly each succeeding year until at present only about 75 deaths are due annually to typhoid. In other words, as a cause of death the disease has become negligible, and its practical extinction can be looked for during the next ten years.

VII. *Subduing the "Great White Plague."*

Admittedly, tuberculosis has been the "toughest nut to crack" of all the communicable disease problems. The consistently developed campaign of the past ten years in Massachusetts against the disease has already given such promising results as to justify the hope of its ultimate complete control no less sanguine than that just expressed relative to typhoid, although it is not possible to predict any such speedy fulfillment in this instance.

To give any adequate account of even the principal features of the tuberculosis campaign would far transcend the limits of this review, hence I will content myself with recounting simply the most important landmarks of the subject in chronological sequence and a general summing up of results.

The first definite step on the part of this Department in 1915 was to set standards for the conducting of municipal tuberculosis dispensaries. This same year saw the inauguration of a system of "follow-up" designed for and carried out by the tuberculosis nurses of the local boards of health and to a certain extent directly by the District Health Officers of this Department in smaller communities where no local facilities for this type of service existed. This system endeavors to keep track of all recorded cases of tuberculosis and has been slowly and laboriously

built up until at present it is reasonably complete and gives up-to-date information of great value in connection with the newer phases of our tuberculosis control campaign particularly by locating promptly principal possible foci of infections affecting children.

In the next year legislation was provided rounding out the program for hospitalization of consumptives by establishing a group of county tuberculosis hospitals to supplement facilities already provided by the larger municipalities and by the four State sanatoria. The same year the legislature authorized the employment of a corps of nurses which was placed in the field by the Department to provide more effective "follow-up" work on tuberculosis, experience having shown that the District Health Officers alone could not carry this work in addition to their other numerous duties. This year also witnessed the inauguration under the direction of the National Tuberculosis Association of the Community Tuberculosis Demonstration in the town of Framingham the findings from which have attracted world-wide attention and have greatly strengthened our reliance upon the wisdom of present methods of tuberculosis control.

With the advent of the war and the call for physicians and nurses for military service, there was considerable dropping backward in the matter of dispensary and "follow-up" service throughout the State, and simultaneously the frequency and fatality of the disease went up for a period of four years ending with 1918. There has been a tendency to explain the great diminution in reported cases and deaths for the years immediately succeeding 1918 on the theory that the influenza epidemic had slain hundreds who otherwise would have died a year or two or three later from consumption. I have never been convinced that there is any valid basis for this statistical argument and as the years have not shown the corresponding upsweep also predicted under this theory I think it may justly be concluded that the influenza influence on tuberculosis mortality and morbidity has been very greatly exaggerated, if it existed at all.

In 1914 emphasis had begun to be placed on the importance of detecting tuberculosis in childhood. Following the transfer of the four State sanatoria to the administrative control of this Department in 1919, a Division of Tuberculosis (Sanatoria) was created charged not simply with the responsibility of the management of the institutions but with all phases of the tuberculosis activities of the Department.

The first step was the transformation of one of the sanatoria already partly so utilized, into an institution for children and adolescents exclusively. At about the same time the staff of that institution under the leadership of the superintendent, Dr. Chadwick, began to carry out surveys of school children in various parts of the State culminating finally in the present State-wide program placed in operation in 1924 for the detection and cure of juvenile tuberculosis of the bronchial glandular type, and for the correction of faulty hygiene and nutritional conditions among school children which will, in the judgment of our staff, tremendously increase the ability of such children to resist in later life the onslaughts of tuberculosis.

In 1922 this Department called attention to the need of an institution for the treatment of forms of tuberculosis other than consumption occurring in both adults and children. This was made one of several recommendations as to the best future tuberculosis hospital policy of the Commonwealth. The same subject being further investigated in 1923 by a Legislative recess committee, it repeated this recommendation and the Legislature of this year took the necessary initial steps to bring this about, along with the enactment into legislation of certain other important recommendations of the same committee relative to tuberculosis institutions, the general effect of which will be to hospitalize adult consumptives principally in county and municipal institutions, and to retain the State Sanatoria for children and the non-pulmonary cases, with sanatorium treatment of adult consumptives eventually restricted to but one State sanatorium.

It would be unfair, even in a very condensed statement of this sort, to make no reference to the steady growth in importance and influence of the various anti-tuberculosis organizations of the State in the struggle against this disease. Due largely to their educational activities there exists today a much more sensible

attitude than ever before on the part of public authorities, the medical and nursing professions, and the general public as to the limitations and possibilities of tuberculosis control and there is a better understanding of the relative harmlessness of consumptives as to other adults.

Judged by the vital statistics standards of measurement the combined net result of the past ten years' effort against tuberculosis has been extraordinarily encouraging. Nor does it detract in the least from a just satisfaction that correspondingly good results are being shown in other states, for the tuberculosis campaign during the past ten years has become truly nation-wide. After making all due allowance for the beneficial effects of the general improvement in standards of living, housing and nutrition there still remains a great residue of achievement in this field in Massachusetts which I consider can be attributed to the application of the principles of preventive medicine and to the program followed by the Department, aided by the voluntary associations, for the control of tuberculosis.

At any rate the fact stands out clearly, unmistakably and beyond argument that the ten years just closing have witnessed a reduction of the death rate from all forms of tuberculosis from a total of approximately 135 deaths annually for each 100,000 of the population in 1914 to one of approximately 90 per 100,000 for 1924. In actual diminution of deaths, not allowing for an increase in population of several hundred thousand, this means an annual saving of 1,500 lives over the record of ten years back.

There remains one other aspect of the tuberculosis control problem regarding which great upward strides have been made in the past ten years. I refer to the campaign for the control of bovine tuberculosis and for the prevention of the transmission of the bovine type of the disease to man through the milk supply. This subject is so intimately associated with other phases of milk sanitation that I will proceed to discuss the entire subject of milk under the next section.

VIII. Progress in Milk Sanitation.

No food product is so closely associated with public health as milk and it is fitting that some brief comment be made upon progress as a State in the past ten years in the handling and safeguarding of this great necessity of life, for such it has become. However possible it may be for other races to thrive without using cows' milk, the increasing inability of American mothers to nurse their infants to the normal age of weaning renders it correspondingly necessary to depend upon the humble cow for the very existence of our civilization. Today's concentration of population in large cities remote from the source of supply makes necessary the careful protection of the milk supply. Increasing scientific knowledge and the more efficient and cleanly methods of the distributors and producers of milk are furnishing such safeguards with constantly growing effectiveness. The decreasing general infant mortality figures, and especially the reduction in infant diarrhoea already discussed, tell the story of progress in the general cleanliness of milk.

The fact that milk under the greatest precautions and highest standards of general cleanliness can still transmit virulent tubercle bacilli and the organisms of typhoid, scarlet fever, diphtheria, and septic throat, not to mention various minor types of infection, has led the health authorities of the State at large persistently to advocate efficient pasteurization. As a result, epidemics from the four diseases mentioned have become very rare and the total number of cases traced to milk has fallen from an average of well over 1,000 annually for the years 1907 to 1915 to an average of a little over 100 for the past four years. During the same four years the percentage of the total pasteurized milk supply of the State has increased from 34 to over 75, with many of the large cities reporting over 90 per cent pasteurized. Many important legislative measures, both State-wide and of local application, have been made effective, culminating during the present year in action by several progressive cities which in effect provides that in the future no milk can be sold in those cities unless it is both of a high grade of cleanliness and efficiently pasteurized, or if sold raw that it must be from herds officially certified to be entirely free from tuberculosis.

This last condition leads to mention of the great growth during the past few years of the movement to eradicate bovine tuberculosis. In this movement Massa-

chusetts came into action relatively late, but under legislation enacted two years ago and the Federal financial assistance now available progress is gradually being made in building up accredited herds and the practical elimination of this menace to human life and health in this State may be anticipated in the not too distant future.

There is noticeable one disturbing feature relative to the milk situation today. In spite of the vigorous campaign by health authorities and the milk and dairy industry to encourage the public to use more milk because of its higher food value for children than any other form of food, the returns as to milk consumption per capita in the larger cities of the State indicate that there has been a distinct falling off in such consumption during the past few years. From the standpoint of the future nutrition of the masses of our people this condition should receive immediate consideration and a course determined upon to recover lost ground and increase the consumption of this indispensable food.

IX. Artificial Safeguards against Infection.

The State Board of Health of Massachusetts passed on to the present Department an admirably organized and equipped institution already firmly established in the confidence of the medical profession and general public. The ten-year period now under review has seen a most useful broadening and expansion of the scope of activities of what is now known as our Division of Biologic Laboratories. Since 1914, great improvements have been made in both the concentration of the active antitoxic principle and removal of inert by-products from the diphtheria antitoxin manufactured at the Laboratory, the composition of anti-meningococcic serum has been better standardized and its potency increased, refinements in process of manufacture and in standardizing of potency have been added to the earlier excellent type of smallpox vaccine produced, research has been carried out on various anti-pneumococcic sera, and in many other fields of biologics, and the preparation and production on a widespread scale of the material for the Schick test and of diphtheria toxin-antitoxin mixture for active immunization against diphtheria has been developed to its present large scale production. The entire equipment of the antitoxin laboratory has been modernized and many time and expense saving methods introduced into both the manufacturing and distributing ends of the Division's functions.

The accompanying growth of reliance upon and confidence in the products of this laboratory by the medical profession of the State is reflected in the increased demands for its products. Nothing more needs to be said to emphasize this point than the statement in the report of 1914 that the distribution of 183,839 doses of diphtheria antitoxin that year had broken all previous records for amounts distributed and that after successive increases in the intervening years there were distributed this year 441,648 doses.

In addition during the past year the laboratory distributed for the use of the health authorities and physicians of the State 309,049 doses of the diphtheria toxin-antitoxin mixture for immunization against diphtheria and sufficient material for testing the susceptibility of individuals to diphtheria to make over 300,000 such tests. From these figures it is easy to see what a powerful influence the Biologic Laboratory has become in disease control in the Commonwealth. The pressing problem now is to obtain sufficient enlargement of our laboratories and stables to keep abreast of the needs of the State for biologic products.

X. Some Innovations in Public Health.

Certain specialized and relatively new types of public health and hygiene effort have been developed in the past ten years by this and other State Departments and by many local departments and organizations interested in health promotion which cannot be passed over at this time. I refer particularly to developments in nutrition, dental hygiene, mental hygiene, physical education and routine instruction in the elements of personal hygiene in the elementary schools. As the Division of Hygiene has developed following its experimental first years, a small group of specialists covering the fields of dental hygiene, nutrition, and school hygiene was gradually developed who have worked in close co-operation with local authorities in stimulating the intelligent furthering of these important factors in public and

personal hygiene throughout the State. Mental hygiene and physical education have been entrusted to two other State Departments, Mental Diseases and Education, for development, but all these subjects have a common ground in that the most effective approach is through the child. These three departments are moving along most co-operative lines towards the furtherance of one common objective, *i.e.*, the development of an all-round physically and mentally fit citizen of the future. So pronounced a feature of the present era have these various movements for the promotion of personal hygiene become that they are believed by many good authorities to constitute the crowning achievement in public health advance of the present generation, and it is worthy of comment that this Department has inaugurated and is working out and adjusting its policies along these newer lines in accordance with the results of its own experiences and the best practices being developed elsewhere in these new fields.

XI. Recreation and the Promotion of the Public Health.

The correlation between recreation within reasonable limits and good physical and mental equilibrium has been noted since remote times, but it has remained for present day science to demonstrate the fundamental physiological and psychological basis upon which this correlation rests and that such mental diversion and physical exercise in the open air is necessary in every-day life, especially for those engaged in sedentary occupations. Therefore, it behooves us as official guardians of the public health to study closely and to promote all movements tending to stimulate healthful exercise and recreation. As the tendency to seek the open increases it becomes the duty of health authorities to see that the public is not exposed to infection and disease at the seashore resort, the summer camp, or on the auto tour.

Therefore, serious study has been given to this problem for several years. Certainly more land is needed both for organized playground and athletic field purposes in or immediately adjacent to our larger cities and should be secured without delay, even in these days of high taxes due to municipal expenditures. Nor is it beyond the reasonable scope of community foresight that small villages should be making similar provisions. There is also an increasing and proper demand by the people for the setting aside of lands for public parks, reservations and camping sites throughout the State for the enjoyment and benefit of our present and future citizens. At the same time private property rights must be respected, land needed for agricultural purposes must be retained, and sources of water supply must be protected from contamination. The problem is not a simple one and needs the thoughtful consideration of every citizen to ensure a just solution along the lines of the maximum public benefit at the minimum of individual privation and annoyance.

Closely allied to outdoor recreation is the promotion of indoor recreation, especially during the winter months, by utilization of such agencies as community centers, gymnasia and swimming pools. All of such agencies exert a powerful beneficial influence on the public health and it is a cause for congratulation that these facilities have increased so greatly in number and popularity in recent years.

XII. Progress in Sanitary Engineering.

Massachusetts has long enjoyed the benefits resulting from its policy of maintaining a State-wide supervision of the condition of its sources of water supplies and of its methods of disposal of domestic and industrial wastes through the expert corps of engineers and chemists constituting the Divisions of Sanitary Engineering and Water and Sewage Laboratories. In general the responsibility for policing and maintaining works of a sanitary service character is in this State placed upon the local authorities, but under general provisions of the statutes the Department constantly examines sources of water supplies and the operation of filtration plants whether for water supply or sewage and industrial wastes purification, and from time to time reports thereon to the local authorities and, when occasions require it, to the Legislature, for such additional local or State-wide action as it deems necessary for the best protection of the public health and avoidance of nuisances. In addition to this highly important routine work, the past ten years has witnessed

several important developments of a new character in the field of sanitary engineering.

Important engineering studies have been carried out under order of the Legislature in reference to the water supplies of Lawrence and Methuen, in reference to sewage disposal plans for the several municipalities in the Merrimack River valley, for the city of Lynn, the city of Gloucester, and jointly for a group of cities in Essex County, Peabody, Salem, Beverly, and Danvers. A long standing source of offense in the Blackstone River valley below the city of Worcester is in process of correction by the construction of very extensive sewage purification works by that city.

Important investigations and studies resulting in great improvement or complete correction of offensive conditions created by the operation of various oil refineries, rendering plants, etc., have been carried out. The ten-year period has seen an increasing amount of annoyance and difficulty created by the present methods of garbage disposal in many cities, but it cannot be claimed that any really satisfactory scientific progress in the handling of the vexatious question has been made in the past few years.

By far the greatest contribution of the Department in the field of sanitary engineering during the past decade was its study jointly with the Metropolitan District Commission of the future water supply needs of the Commonwealth. This work was carried out on an intensive scale over a two-year period and resulted in the recommendation that a large extension to the westward of the present water supply works of the Metropolitan District be made so as to furnish permanent future supply, not only for the present Metropolitan District, but for the city of Worcester and many other cities and towns in Eastern Massachusetts which must in the near future seek new or additional sources of water supply. Because of the size of the project recommended in the report and because of the opposition of mill and local interests which would be affected by the proposed new sources of supply from the Swift and Millers rivers, the Legislature has ordered another study of the entire problem by a special commission appointed for that purpose which study is now in process.

In the same report a recommendation was made by the Joint Board of this Department and the Metropolitan District that a chain of large ponds in the southeastern part of the State, known locally as the Lakeville Ponds, should be set aside for the joint future development for water supply purposes by all the cities and large towns of Southeastern Massachusetts which were not already assured of ample quantities of water of satisfactory quality. In line with this recommendation the cities of Fall River, New Bedford and Taunton last year sought and obtained legislation creating a metropolitan water supply district for that portion of the State.

XIII. The Challenge of Cancer and Cardiac Conditions.

Very gratifying indeed would it be if health departments could say with the old sun dials, "We record only pleasant hours". Unfortunately, in contrast to the highly encouraging showing in infantile diseases and communicable diseases in general, it is necessary in presenting a general picture of the state of the public health and of our experiences for the period under consideration to make an accounting of the losses as well as the gains. Some reference has already been made to the increase in fatalities from accidents, apoplexy, heart disease, and cancer. I wish particularly to emphasize here the significance of our experience in cancer and organic heart disease, both because these two diseases show the most striking consistent increase in fatality year after year of any of the more important causes of death and because it appears that the potential weapons of defense against the onslaughts of these two maladies are not utilized to anywhere near their full extent.

Of the two, organic heart disease causes the largest number of deaths and while it is not gaining in relative standing as a cause of death with the same steady inexorable yearly rise that characterizes cancer, still it cannot be said as yet that there is any definite indication that its advance has been even checked, to say nothing of any indication of its being successfully prevented. In many ways the outlook for a successful outcome of an organized intelligent drive against heart

disease is just as encouraging and in some particulars more encouraging than the corresponding outlook against tuberculosis twenty years ago. At that time in Massachusetts the average number of deaths from tuberculosis was in the neighborhood of 7,000 annually; of deaths from heart disease 4,000. The average for the past ten years has been in the neighborhood of 4,500 and 7,500 respectively, or in other words the two causes have a little more than exchanged relative places. Yet a person is just as much dead from heart disease as from tuberculosis. That bald statement is in itself enough to challenge our interest. If in addition it can be demonstrated that these cardiac conditions can be prevented or, where the mischief has already begun, greatly improved, just as with tuberculosis, then these figures assume the proportions of a grave tragedy and to just that degree have the possibilities of preventive medicine in this field been neglected.

Here are the facts: There are today in this State at least 75,000 people suffering from heart disease in a recognizable form, to say nothing of the large number destined under present conditions to die perhaps suddenly without having any intimation of their cardiac condition. By the term "recognizable form" I mean heart disease giving rise to sufficient symptoms to interfere with work, exercise, or comfort. There are at least 10,000 children of school age that have already acquired some definite condition of the heart which could be detected if thorough-going physical examination service was as well established a routine of the educational system as it should be. The significant thing about this last group is that with the great majority of them an intelligent planning of their personal hygiene and particularly of their future life work would enable them to enjoy a relatively long, happy and useful adult life with the cardiac condition amply safeguarded and compensated for. Under the present lack of supervision and direction thousands of this group will go ahead without any such knowledge only to break down with acute heart disease in early adult life.

The most common cause of heart disease is so-called "rheumatism," or more properly that chain of infections ranging from tonsillitis and St. Vitus dance to acute rheumatic fever and acute endocarditis in outward manifestation, but which are in all probability due to one and the same though as yet unrecognized infecting organism or virus. The next is syphilis. To a large degree this means that *many forms of heart disease are preventable* and many others quite distinctly *curable in their earlier manifestations*. Again as in the case of tuberculosis, intelligent appreciation of the facts through organized education of the masses as to the fundamental peculiarities of cardiac disease is what is most needed, and when this is adequately done results not far removed from those achieved in reference to tuberculosis can be anticipated.

As to cancer, it must be admitted that the outlook is not as encouraging as for the checking of the ravages of heart disease. The mystery that still surrounds the causation of cancer baffles at every turn in the efforts to cope with the disease. Yet much can be done, even under present limitations, to mitigate its evils. Yearly new possibilities in the line of specific radiation therapy are slowly unfolding, and the technique of surgical interference has now been brought to such a stage of perfection that very satisfactory permanent cures can be realized in a high percentage of cases classed as favorable. But essentially in dealing with cancer this technical term "favorable" means simply that the case is recognized and brought to treatment in the earliest detectible stages of the disease. Hence the logical procedure for health departments in this matter, pending the demonstration of the validity of new scientific discoveries, is the persistent fostering of a campaign of education among the people as to the significance of cancer, its cardinal indications in the early and painless stages, and to make available to all without undue expense through the channels of the medical profession up-to-date guidance and assistance in the form of laboratory diagnosis. Precisely along this line the present policy of this Department is being developed in its attempt to meet the menace of this terrible disease.

XIV. *The Growth of the Health Center.*

The health center idea unquestionably stands out among the developments of the past ten years in health work as the most unique innovation brought to bear upon community health problems.

There still remains even among the medical profession and people otherwise

well informed regarding general civic affairs much vagueness as to the essential character of a modern health center. There is none in the minds of the people in whose midst one stands after they have had time to become familiar with it. A health center is decidedly not a dispensary in any sense. Its mission is not to treat the sick, but to prevent the well from being sick. But it is much more than that. As it has been put by one of America's leading sanitarians, it is a place for the "translation of the quickly developing facts of science into the language, habit and use of households; for the interpretation by the busy messengers of health of the theory and practice of life in terms of the kitchen, playground and nursery."

It is but a decentralization of the activities of the great city health departments from the city hall into the district neighborhoods and for the smaller communities a bringing together under one roof of various scattered agencies concerned with community health and welfare. In both large and small communities one distinctive feature of the true health center is the centering in one place of the official health department workers and the representatives of the community's voluntary health organizations.

The idea of a health unit as an agency for the more effective bringing of the message of health and for the better extending of the facilities for service by a city health department directly into the neighborhoods of great cities was first developed by the Health Department of New York in 1914. At that time a very small simply equipped center was opened in what had formerly been a small shop in the heart of the most congested tenement house district of that city. The value and practicability of the scheme were so quickly apparent that the idea soon spread to other cities, among them Boston where in 1916 a municipal ward room on Blossom Street was converted into Boston's and Massachusetts' first health center. From the beginning emphasis was placed on the correlating of the work of the health department of the city and that of voluntary health organizations, particularly the district nursing association, the tuberculosis association and the family welfare, and later all the voluntary health societies and philanthropic institutions and organizations holding membership in the Boston Health League.

Following the princely bequest of one of Boston's great citizens, Mr. George Robert White, of several millions of dollars, the income of which is by terms of the trust to be devoted to the creating of works of utility and beauty for the use and enjoyment of the inhabitants of the city of Boston, the trustees with rare wisdom and foresight decided to devote the major portion of this fund to the erection of a chain of health units, leaving the maintenance responsibility after their erection where it most properly belongs, upon the general tax rate. The first of these centers has recently been dedicated and in it is now going on, with the added impetus such admirably adapted surrounding facilities and equipment give it, the same type of work that had already so successfully been developed in the relatively cramped quarters of the Boston City Health Department's Blossom Street Health Unit.

The fundamental keynote of the Health Center is hygienic education by direct contact of the health workers with the fathers, mothers and children of the district. The development of the public health nursing to its present high plane as a distinct specialty has done more than anything else to prepare the way and make possible the present type of health center or unit. The devoted service of the nurse in bringing the message of health into the home has created a realization of the value, the availability and the significance of good personal hygiene to such an extent that today parents eagerly seek further light and guidance in the health center where it is extremely doubtful if ten years ago such a magnificently equipped structure as the new Robert White Fund Health Unit would have been appreciated or patronized by those in whose midst it stood.

The modern health unit director can well say with the Roman poet, "Nothing that pertains to man is foreign to me" for the advice and counsel of himself and staff are sought increasingly on every type of personal, family, social and neighborhood problem, but the health center particularly gives such services as maternal, prenatal, postnatal, infant health, child hygiene, dental hygiene, nutrition, community nursing service of all types, mental hygiene, facilities for biologic therapy of all kinds, periodic health examinations and health education.

It is very important, however, in this survey of the State not to lose sight of the

fact that it is not the Metropolitan section alone in which the health center has demonstrated its value and established a firm place for itself during the past ten years. In Worcester, Lawrence, Springfield, Lowell, Cambridge, Lynn, Fall River, New Bedford, and in all our larger cities under widely varying auspices and completeness of equipment and program, the essential basic idea of the health center has been put into operation. But even more interesting perhaps is the demonstration of the practicability of the same idea in relatively small communities. Immediately following the war the Red Cross grasped the community health center idea with enthusiasm and in many instances took the initiative in bringing about the development of the idea by offering common quarters to various community health and welfare organizations having either widely scattered locations in the community or in many instances possessing no permanent headquarters. In practically all instances the official health departments have been asked to join in the project and almost without exception have accepted with alacrity the opportunity thus provided for closer team work for health conservation.

As a result there are now some score or more of well established health centers in the State carrying on from five to ten distinct but correlated types of community health service from the same headquarters and making of that headquarters a real community health home towards which citizens turn instinctively for advice and guidance in all matters pertaining to their personal, family and neighborhood health problems. Then there are probably twice as many feeblar beginnings principally in our smaller cities and larger towns where what might be designated as embryonic health centers are gradually making headway and are increasing in popular esteem at such a rapid rate that it is easy to foresee that before long the greater part of the population will be served by this most practical and unique form of present day health service which brings directly to the threshold of the average family in a neighborly human and sympathetic form the results of the highly specialized effort and advancements in modern biologic and medical and social research.

XV. *Local Health Departments Progress.*

In the last analysis the real effectiveness of official health activity as in many other phenomena of present day society, depend upon the relative degree of achievement demonstrated individually by the local political units, the cities and towns. In many respects state health organizations function as a common service agency for the several local health units, and to a considerable degree whatever showing may be made for the State as a whole in public health achievement is but a reflection of the aggregate energy, foresight and progress of the individual communities. Hence it is fitting in a review of the present character that definite emphasis should be placed upon the progress of local health departments and school departments (along child health lines); neither should the contributions of the local health agencies of a voluntary nature be forgotten.

Just how to do justice to them within relatively very brief compass has severely taxed my ingenuity. At my direction the several district health officers of the Department have filed brief résumés of outstanding achievements of the cities and towns in their districts in official health departmental practice during the past ten years. To report even in most summarized form upon the health advance of all communities would mean a list fairly comparable in length with the famous catalogue of the ships before Troy, would doubtless be even more monotonous and would still fail to do justice to all our communities individually. To select a few of the largest municipalities and recount some of their most noteworthy advances would be obviously unfair to the long roll of smaller cities and larger towns which have within the limitations of their size and taxable valuations made proportionately as great advances in health administration.

Certain features of a progressive character stand out very prominently in a survey of the activities of local health departments as a whole. Perhaps the most surprising and unexpected fact is that there has been relatively few additions of full-time general executives of local boards and departments of health, in sharp contrast to the experience of the country as a whole which has witnessed so great an increase in the number of such officials as to make this one of the most arresting features of the period. Massachusetts had, however, developed a large number

of non-technically trained but permanent local health executives prior to the period under consideration. Undoubtedly this is the reason why there have been but very few such additions during the decade. It is usual in this State to find a full-time executive of the local health board in all communities of 15,000 and over.

On the other hand, when personnel other than health officers is considered, a development or expansion appears that can be rightly characterized as extraordinary. Selected at random and as representative of the Commonwealth as a whole we note that one city in the 100,000 population class has added 16 additional personnel to its health department staff since 1914. Another city in the 50,000 class has added 9, and in very many towns of not over 12,000 population the comment is made that the board of health has a full-time executive, non-medical, but very progressive and desirous of making available for the benefit and protection of their citizens the most modern practical measures developed by the science of preventive medicine.

But it is particularly the local activities relating to infant and child hygiene in all its phases that show the most striking rate of progress in so short a period of time as ten years. Official health departmental activity and concern in these fields are still so new that it is difficult to realize what deep root they have taken all over the State and how intensely they are influencing for good the homes of our people. The increased frequency of visits of the public health nurse to the home and the resulting visits of mothers and children to the physician in the clinics is the most striking and fruitful development in public health procedure that the past decade can claim. As one of the district health officers put it in his summary, this period may well be called the era of the *rise* of the public health nurse.

The following statement may be regarded not as exceptional but typical of the conditions all over the State:

"In my district with 36 towns and several cities there were some beginnings of public health nursing service in all the cities but in the towns no nurses of any kind supported by public funds in 1914. At present there are but two towns which do not have some type of publicly financed nursing service."

For the large area and population embraced in the second health district, which includes the city of Boston, the District Health Officer reports that while in the fifty-odd cities and towns, exclusive of Boston, public health nurses were practically unknown in 1914, at the present time there are no less than 150 such nurses whose services are so distributed that but one small town in the district still lacks any type of public health nursing service. Similarly striking statements can be found in the reports from each district.

But it is not in public health nursing alone that Massachusetts cities and towns have shown their intention to keep fully abreast of the times by the addition of trained public health personnel to meet the growing demands for health service. The following summary of the additions in personnel of one of the most progressive larger city health departments is a good example of the trend in this direction of the state as a whole. This city is in the 100,000 to 200,000 population class.

"Addition of full-time employees since 1914 include: A supervisor of nurses, 11 additional public health nurses, one additional sanitary inspector, one additional slaughtering inspector, one additional milk inspector, one dairy farm inspector, one chief of dental clinics, six dentists and dental hygienist —" and in this particular city the school hygiene service is maintained by the Department of Education employing for that purpose a full time medical director and an adequate staff of school nurses.

Another city of comparable size reports 14 additional staff during the ten years, exclusive of clerical additions.

According to the data on file at the office of the Department there are now approximately 1,200 public health nurses in the state, of which number 358 are retained as school nurses, the remainder engaged in infant hygiene, tuberculosis, industrial nursing, and general board of health nursing. The returns are known to be somewhat incomplete in respect to industrial nurses.

Equally interesting and impressive are the accounts of the growth of the past

few years in general activities by local health departments in the field of infant and child hygiene prior to school age practically in all cases in co-operation with voluntary organizations of the communities.

In this important phase of modern public health administration the establishment of a voluntary organization, the Boston Milk and Baby Hygiene Association in 1909, with a staff of 8 nurses and a group of volunteer unpaid physicians conducting the clinics, may be said to mark the beginning of systematic infant hygiene work in the state although other small beginnings had already been made here and there. The most significant point is that in 1914 excepting Boston and two or three other large cities, systematic infant hygiene work was very rare, and was only being done occasionally as an incident in the regular day's routine by the staff of the various district nursing associations.

Possibly the statement may be doing some progressive city health departments of the State an injustice but the records in this Department do not show that any local health department prior to 1914 had a corps of infant hygiene nurses, or maintained any well baby clinics, or conducted prenatal clinics, although several early instituted the custom of routine postnatal visiting by their nursing staffs.

Today well-organized series of baby clinics are held in all the larger cities, they are by no means a rarity in the larger towns, and from time to time, largely in co-operation with the staff of our Division of Hygiene, well baby conferences are held even in relatively small rural communities.

In the great field of communicable disease control marked advances are reported from every section of the state among the large communities. As much cannot be said for the smaller towns where the problem of adjusting limited population and resources to the needs of a modern system of communicable disease control has not yet been satisfactorily approached. But by such agencies as isolation hospitals, tuberculosis and venereal disease clinics, special clinics for immunization against diphtheria, communities as a whole have accomplished very striking advances in coping with communicable disease problems in the past few years.

Nor can advances in general sanitation be overlooked.

Most conspicuous among advances in this respect is the improved care of the milk supply. Accomplishments in this very important field of sanitation are reported almost uniformly from all parts of the State, from the large cities down to small towns.

Improvements are also noted in regard to the sanitation of slaughtering establishments and local food handling establishments.

Massachusetts long ago established an enviable position in reference to such fundamental features of community health as safe water supplies and properly operated systems of sewage collection and disposal. In fact even at the beginning of the period under consideration there were but few towns over 5,000 in population which did not already possess a public water supply and very few beyond the size which did not possess at least a partial sewerage system.

Yet it is significant of the constant need of watchfulness in respect to these matters that in one of the three health districts that converge upon Boston, out of a total of about 50 cities and towns, the district health officer reports that no less than 18 of them have made some increases or improvements in their water or sewerage systems and the public water question is still acute in many of them.

Finally several reflections and comments of a fundamental character stand out after a study of the summaries of ten years' progress in public health in both the large and small communities of Massachusetts.

I. It is no mere coincidence that step by step with this remarkable improvement in the mortality showing of the communicable diseases and infant deaths is to be traced this tremendous multiplication of the modern agencies for the control of infections of all types and for the improvement in the hygiene of the infant, the runabout baby and the school child all over the Commonwealth.

II. The growth in importance of the public health nurse as an agency for health promotion is perhaps the most remarkable sanitary feature of the decade.

III. The increase of interest in measures to promote the individual hygiene of the growing child as illustrated by the multiplication of agencies for physical

education, for mental hygiene, the response to the department's campaign for protection against diphtheria, the teaching of health habits and general awakening of interest on the part of teachers in matters pertaining to the health of their charges; all this is not only important from the standpoint of present achievement but holds forth much promise of still greater results in the near future.

IV. Another encouraging sign of the times in health administration distinctly brought out by this rough survey of the progress of the past decade is the growing tendency on the part of non-official agencies to turn over to health departments functions of all sorts, but particularly those pertaining to the promotion of personal hygiene.

V. The increase of interest in such new measures as health centers, nutrition classes and dental clinics indicates that the public is genuinely interested in the sane promotion of practicable community health programs. As a result far less attention is being focussed by local health departments on such subjects as nuisances, fumigation and plumbing inspection than was the case ten years ago, and such objectives of official health departmental concern as prenatal work, infant hygiene, school hygiene and the like have come to occupy a prominent place in the programs of local health departments in practically *all* instances a type of service that has come into existence since 1914.

I will quote from a few reports at random. City of A "since 1914 has opened and regularly maintains five well baby clinics." City of B "operates series of well baby clinics in various sections of city with total staff of eleven nurses and five physicians." City of C "staff of eight nurses do infant hygiene and school hygiene work combined, the city being districted for this purpose and each nurse held responsible for the infant hygiene problems of her district." City of D "five nurses giving full time to child hygiene work below school age."

Reference of an incidental character has already been made to school hygiene progress in this report, particularly in discussing the great increase in public health nursing in the schools. The law enacted in 1921, requiring all towns except a few of those having total valuation of less than one million dollars worth of property, *i.e.*, specially exempted at the discretion of the State Department of Education to furnish school nursing service, has greatly stimulated the extension of school nursing, and very hopeful for future progress has been the general desire of the smallest towns not to seek the exemption allowed but on some part time basis to secure all such school nursing service as they could possibly afford.

In this connection the following is significant.

In 1919 systematic school nursing service whether full time or part time basis existed in only 95 cities and towns of the total 356. In January 1922 there was such service in 238 cities and towns, in January 1923 in 327, in January 1924 in 342, and on January 1, 1925, it is reported that there will be such service in practically every city and town in the state.

Not alone in school nursing service has there been a great advance in school hygiene in the past ten years.

In such matters as medical examinations, routine communicable disease follow-up, health teaching in the schools, and particularly in nutrition and dental hygiene classes, there has been extraordinary development. The district health officers report that today there are regularly conducted dental clinics in practically all cities of over 50,000 in population. More indicative of the relative prominence of these newer measures of school hygiene is the interest taken in the smaller cities and towns; for example, in the Connecticut valley section of the State no less than 9 of the 43 towns now support regularly established school dental clinics, and in addition to these a Red Cross travelling school dental clinic gives service to all the small towns of the Hampshire County having no resident dentist.

Ten years ago systematic nutrition teaching and special attention to the undernourished poorly developed school child by means of special nutrition classes were practically unknown in any of our cities and towns. The following excerpts are fairly illustrative of the situation today in reference to this important hygienic measure.

From the second health district "Regular nutrition teachers have been taken over (*i.e.*, from various voluntary pioneer auspices) in Boston, Brookline, Brock-

ton, Cambridge and Newton and in all but the very smallest towns in the district nutrition classes are conducted by the school nurses."

From the sixth health district: "Nutrition work in the schools is now developed in 24 cities and towns of the district."

Appropriations and Expenditures for the Year ended Nov. 30, 1924.

	Appropriations.	Expended.
Division of Administration	\$32,623 78	\$28,591 38
Division of Hygiene	40,691 01	38,896 84
Maternal and Infant Hygiene	44,676 53	40,509 09
Division of Communicable Diseases	71,119 02	70,317 76
Sub-division of Venereal Diseases	38,397 10	37,691 05
Manufacture and Distribution of Arsphenamine	20,441 25	19,707 29
Division of Foods and Drugs	59,643 29	57,210 56
Division of Biologic Laboratories:		
Antitoxin and Vaccine Laboratory	75,000 00	74,795 65
Wassermann Laboratory	17,993 14	17,517 35
Division of Tuberculosis	46,600 00	39,899 76
Subsidies to cities and towns	170,000 00	168,247 87
Division of Sanitary Engineering	54,876 27	51,459 45
Division of Water and Sewage Laboratories	39,700 00	38,606 72
State Examiners of Plumbers	5,609 36	4,870 01
Penikese Hospital	1,600 00	1,200 00
Totals	\$718,970 75	\$689,520 78

Special Appropriations and Expenditures for the Year ended Nov. 30, 1924.

	Appropriation.	Expended.	Balance.
Concord Valley Sewage Disposal	\$3,000 00	\$1,241 40	\$1,758 60
Gloucester Sewage Disposal	4,000 00	2,508 20	1,491 80
Lawrence and Methuen Water Supply	6,000 00	1,264 46	4,735 54
Salem, Beverly, Peabody and Danvers Sewage Disposal — 1924	5,000 00	190 10	4,809 90
Health and Medical Service in Outlying Districts	2,000 00	1,593 48	406 52
Totals	\$20,000 00	\$6,797 64	\$13,202 36

Expenditures from Balances of Special Appropriations of Previous Years.

	Appropriation Balances.	Expended 1924.	Unexpended Balance.
Neponset Valley:			
Real Estate, Betterment Assessments, 1922	\$4,111 02	\$115 20	\$3,995 82
Expert Testimony, 1923	2,865 89	—	2,865 89
Restoration Rights of Way, 1922	645 64	—	645 64
Investigation of Sewerage System Salem, Beverly, Peabody and Danvers, 1923	2,060 68	1,053 37	1,007 31
Merrimack Valley Investigation, 1923	12,867 11	6,799 52	6,067 59
Totals	\$22,550 34	\$7,968 09	\$14,582 25

Expenditures of Tuberculosis Sanatoria for the Year ended Nov. 30, 1924.

	Rutland.	Lakeville.	Westfield.	North Reading.	Totals.
Appropriation for Maintenance	\$316,722 88	\$205,615 00	\$194,100 00	\$154,925 98	\$871,363 86
Personal Services	138,459 80	92,670 82	91,224 49	74,356 64	396,711 75
Religious Instruction	1,807 50	1,265 00	1,329 60	1,600 00	6,002 10
Travel, Transportation and Office Expenses	3,195 90	4,385 80	2,897 75	1,846 94	12,326 39
Food	75,478 76	31,884 42	38,583 03	40,643 45	186,589 66
Clothing and Materials	197 78	—	1,798 25	47 28	2,043 31
Furnishings and Household Supplies	11,134 04	10,987 24	9,899 03	4,519 43	36,539 74
Medical and General Care	9,240 50	4,537 87	4,667 34	3,778 77	22,224 48
Heat, Light and Power	19,643 23	17,920 44	8,252 59	9,704 46	55,520 72
Farm	8,728 29	18,326 30	10,702 91	4,727 40	42,484 90
Garage, Stable and Grounds	2,927 76	3,175 04	4,427 60	1,248 05	11,778 45
Repairs, Ordinary	8,292 54	6,796 36	8,616 25	2,845 36	26,550 51
Repairs and Renewals	18,585 26	7,852 47	5,725 09	2,343 15	34,505 97
Total Expenditures	\$297,691 36	\$199,801 76	\$188,123 93	\$147,660 93	\$833,277 98
Unexpended Balance	\$19,031 52	\$5,813 24	\$5,976 07	\$7,265 05	\$38,085 88
Average Number of Inmates	360	216.3	266.7	193.1	1,036
Weekly Per Capita Cost	\$15 90	\$17 75	\$13 56	\$14 70	—
Receipts for Board of Inmates	\$78,028 36	\$27,741 52	\$39,865 12	\$29,814 96	\$175,449 96
Receipts from Sales	1,533 29	7,708 22	1,249 30	299 87	10,790 68
Interest on Bank Balances	2,927 05	121 97	26 29	102 93	548 24
Miscellaneous Receipts	171 88	27 95	57 03	89 48	346 34
Total Receipts	\$80,030 58	\$35,599 66	\$41,197 74	\$30,307 24	\$187,135 22
Refunds, Account of Previous Year	85 04	1,035 44	43 49	24 37	1,188 34
Total Collections	\$80,115 62	\$36,635 10	\$41,241 23	\$30,331 61	\$188,323 56

EUGENE R. KELLEY, M.D.,
Commissioner of Public Health.

REPORT OF DIVISION OF SANITARY ENGINEERING.

X. H. GOODNOUGH, *Director and Chief Engineer.*

OVERSIGHT AND CARE OF INLAND WATERS.

Water Supply and Sewerage.

The Division of Sanitary Engineering received during the year 1924 a total of 258 applications for advice with reference to water supply, drainage and sewerage, the largest number for many years. Of these applications, 182 related to water supply, 12 to sources of ice supply, 22 to sewerage, 9 to pollution of streams, and 33 to miscellaneous matters. There were also 77 applications relating to private wells.

Of the 355 cities and towns in the State, a total of 218 are provided with public water supplies which serve the whole or a considerable portion of their territories. While no new water supplies have been introduced in towns not previously supplied with water, the year has nevertheless been an active one in water supply investigation, the drouth of the summer and early autumn having shown the inadequacy of many of the sources in use, especially in and about the Metropolitan district.

The excessive rains in the latter part of 1923 and in the winter and spring of 1924 raised the reservoirs depleted by the short drouth of 1923 to their full capacity at the beginning of the summer, but during the remainder of the year the rainfall was on the whole less than the average and a serious shortage again occurred in places using water in excess of the safe yield of their sources.

The rainfall in 1924 throughout the State as a whole was below the normal, especially in the Connecticut valley and in the southeasterly part of the State, while in the extreme western portion the deficiency was comparatively slight. There was an excess of rainfall in the months of January, April, August and September, and a deficiency in the remaining months of the year. The rains of late August and September were excessive in small areas in the easterly part of the State and prevented what would otherwise have been serious shortages in some of the supplies in this region.

The rainfall on the Nashua River drainage area within the watershed of Wachusett Reservoir in the central part of the State was 6.68" below the normal and the average flow of the river was 1,035,000 gallons per square mile per day or about 5.7% less than the average flow for the last 28 years. The flow of the Nashua River in 12 of the 28 years since the observations were first begun has been less and often much less than its average flow in the year 1924.

The problems of water supply received much attention by the Legislature during the year and a notable accomplishment was the enactment of Chapter 400 of the Acts of the year 1924 providing for the taking of the Lakeville Ponds, so called, in Plymouth and Bristol counties for the water supply of the cities of New Bedford, Fall River and Taunton and towns in the southeastern part of the State. This measure was enacted in general accordance with the recommendations of the Joint Board in its report upon Water Supply Needs and Resources in the year 1922.

THE SANITARY PROTECTION OF WATER SUPPLIES.

Under the provisions of Chapter 111 of the General Laws, rules and regulations were established by this Department during the past year for the sanitary protection of the water supply of the town of Milford. The rules and regulations adopted were similar to those which have been established by this Department in previous years for the protection of the water supplies of the following cities, towns and districts:

Abington and Rockland	Attleboro	Cohasset
Adams	Braintree	Concord
Amherst	Brockton and Whitman	Dalton
Andover	Cambridge	Danvers and Middle-
Ashburnham	Chester	ton
Ashfield	Chicopee	Easthampton

Fall River	Lincoln and Concord	Randolph and Holbrook
Falmouth	Lynn	Rockport
Fitchburg	Marlborough	Russell
Gardner	Maynard	Rutland
Great Barrington	Medfield (State Hospital)	Salem and Beverly
(Housatonic)	Metropolitan Water Dist.	Springfield
Greenfield	Milford	Springfield and Ludlow
Haverhill	Montague	Stockbridge
Hingham and Hull	Newburyport	Taunton
Holden	Northampton	Wakefield
Holyoke	North Andover	Westfield
Hudson	Northborough	West Springfield
Lee	Norwood	Weymouth
Leicester (Cherry Valley	Peabody	Williamsburg
and Rochdale)	Pittsfield	Winchester
Leominster	Plymouth	Worcester

EXAMINATION OF PUBLIC WATER SUPPLIES.

The public water supplies of the State have been examined as usual during the year by the engineers of this Division and samples of the water of various sources have been analyzed chemically and microscopically, the latter in the case of surface waters, while bacterial examinations have been made of those waters where such tests appeared to be necessary or desirable. The following are the average yearly results of chemical analyses of samples of water from public sources examined during the year 1924.

*Analyses of the Water of Public Water Supplies.**Averages of Chemical Analyses of Surface-Water Sources for the Year 1924.*

[Parts in 100,000.]

CITY OR TOWN.	Source.	Color.	Residue on Evaporation.	AMMONIA.			Chlorine.	Hardness.
				Free.	ALBUMINOID.			
					Total.	Sus- pended.		
Metropolitan District	Water							
	Wachusett Reservoir, upper end	.21	3.95	.0023	.0123	.0021	.23	1.2
	Wachusett Reservoir, lower end	.09	3.69	.0020	.0108	.0020	.23	1.2
	Sudbury Reservoir	.13	4.05	.0024	.0117	.0024	.27	1.5
	Framingham Reservoir No. 3	.14	4.44	.0023	.0123	.0023	.25	1.6
	Hopkinton Reservoir	.38	4.69	.0023	.0147	.0042	.31	1.4
	Ashland Reservoir	.42	4.58	.0019	.0136	.0022	.26	1.5
	Framingham Reservoir No. 2	.59	6.73	.0055	.0172	.0029	.66	1.9
	Lake Cochituate	.11	7.04	.0016	.0188	.0064	.63	2.9
	Chestnut Hill Reservoir	.14	4.44	.0014	.0117	.0023	.29	1.6
	Weston Reservoir	.12	4.20	.0016	.0116	.0022	.28	1.6
	Spot Pond	.06	3.95	.0013	.0142	.0026	.30	1.5
	Tap in State House	.13	4.05	.0011	.0112	.0024	.28	1.5
	Tap in Revere	.05	4.13	.0011	.0106	.0016	.29	1.5
	Tap in Quincy	.12	4.07	.0007	.0095	.0016	.29	1.6
Abington	Big Sandy Pond	.02	3.80	.0050	.0112	.0020	.70	0.8
Adams (Fire District)	Dry Brook	.12	7.21	.0016	.0073	.0007	.11	5.2
	Bassett Brook	.00	7.11	.0008	.0047	.0005	.11	5.9
Amherst	Amethyst Brook large reservoir	.33	4.32	.0017	.0130	.0035	.14	1.2
	Amethyst Brook small reservoir	.15	4.00	.0044	.0138	.0043	.16	1.3
Andover	Haggett's Pond	.10	4.77	.0016	.0139	.0024	.33	1.8
Ashburnham	Upper Naukeag Lake	.02	3.01	.0009	.0075	.0017	.13	0.6
Ashfield	Bear Swamp Brook	.15	5.28	.0013	.0083	.0013	.10	2.9
Athol	Phillipston Reservoir	.39	3.94	.0033	.0253	.0108	.13	1.1
	Buckman Brook Reservoir	.06	2.97	.0018	.0095	.0024	.11	1.2
	Thousand Acre Meadow Brook	1.23	5.42	.0064	.0210	.0036	.13	1.4
	Inlet of filter	.59	4.55	.0059	.0185	.0034	.12	1.6
	Outlet of filter	.39	4.42	.0030	.0149	.0033	.12	1.5
Barre	Reservoir	.06	3.95	.0049	.0138	.0043	.17	1.2
Blandford (Fire Dis- trict)	Freeland Brook	.00	3.77	.0009	.0054	.0007	.26	1.2
BROCKTON	Silver Lake	.03	3.92	.0021	.0110	.0021	.54	0.9
Brookfield	Cooley Hill Reservoir	.02	5.81	.0003	.0068	.0004	.34	1.8
CAMBRIDGE	Lower Hobbs Brook Reservoir	.15	5.97	.0026	.0202	.0043	.37	2.5
	Upper Hobbs Brook Reservoir	.43	6.68	.0031	.0205	.0031	.37	2.5
	Stony Brook Reservoir	.33	7.21	.0029	.0175	.0028	.44	2.7
	Fresh Pond	.09	8.46	.0067	.0207	.0079	.52	3.9

Averages of Chemical Analyses of Surface-Water Sources, etc. — Continued.

[Parts in 100,000.]

CITY OR TOWN.	Source.	Color.	Residue on Evaporation.	AMMONIA.			Chlorine.	Hardness.
				Free.	ALBUMINOID.			
					Total.	Sus-pended.		
Cheshire	Thunder Brook	.01	6.28	.0050	.0047	.0002	.10	4.0
	Kitchen Brook	.02	6.15	.0015	.0047	.0008	.09	3.9
Chester (Fire District)	Austin Brook Reservoir	.07	3.63	.0006	.0069	.0005	.12	1.8
	Horn Pond	.11	3.72	.0017	.0121	.0020	.12	1.9
CHICOPEE	Morton Brook	.01	4.82	.0023	.0037	.0009	.25	1.5
	Cooley Brook	.26	5.17	.0045	.0077	.0019	.18	1.7
Clinton	Tap in town	.15	3.97	.0014	.0093	.0012	.19	1.0
Colrain (Griswoldville)	McClellan Reservoir	.00	7.18	.0023	.0055	.0009	.10	4.3
Colrain (Fire District								
No. 1)	Mountain Brook Reservoir	.04	9.62	.0016	.0055	.0005	.09	6.1
Concord	Nagoe Pond	.01	3.31	.0025	.0097	.0015	.32	1.0
Dalton (Fire District)	Egypt Brook Reservoir	.16	3.35	.0014	.0092	.0015	.09	1.3
	Windsor Reservoir	.48	5.32	.0100	.0207	.0064	.09	2.7
	Cady Brook	.24	5.10	.0022	.0100	.0014	.09	2.7
Danvers	Middleton Pond	.35	4.62	.0022	.0161	.0032	.30	1.7
	Swan Pond	.20	4.34	.0022	.0141	.0015	.30	1.7
Deerfield (South Deerfield Water Supply District)	Roaring Brook	.03	6.74	.0006	.0046	.0005	.12	3.6
Egremont (South)	Goodale Brook	.00	4.84	.0005	.0027	.0005	.09	2.7
FALL RIVER	North Watuppa Lake	.07	4.24	.0021	.0130	.0026	.45	1.2
Falmouth	Long Pond	.00	4.18	.0010	.0081	.0013	.96	0.7
FITCHBURG	Meetinghouse Pond	.03	3.36	.0042	.0118	.0024	.16	1.2
	Scott Reservoir	.05	3.73	.0058	.0125	.0021	.19	1.0
	Wachusett Lake	.06	3.50	.0047	.0137	.0023	.16	1.1
	Falulah Brook	.07	3.51	.0060	.0118	.0023	.16	0.9
	Ashby Reservoir	.21	3.38	.0069	.0164	.0037	.13	0.9
Gardner	Crystal Lake	.03	5.20	.0034	.0110	.0017	.30	2.3
GLOUCESTER	Dike's Brook Reservoir	.30	4.70	.0038	.0107	.0021	.73	0.8
	Wallace Reservoir	.42	4.83	.0021	.0133	.0028	.85	1.0
	Haskell Brook Reservoir	.11	4.52	.0018	.0078	.0012	.69	0.9
Great Barrington (Fire District)	East Mountain Reservoir	.07	5.50	.0027	.0094	.0025	.10	3.8
	Green River	.01	8.57	.0006	.0041	.0004	.09	7.2
Great Barrington (Housatonic)	Long Pond	.03	9.05	.0006	.0144	.0006	.12	6.6
Greenfield	Glen Brook Upper Reservoir	.02	5.81	.0028	.0077	.0018	.13	3.3
	Glen Brook Lower Reservoir	.03	5.61	.0024	.0077	.0015	.12	3.1
Hadley (Water Supply District)	Hart's Brook Reservoir	.06	4.43	.0026	.0089	.0016	.16	2.1
Hatfield	Running Gutter Brook Reservoir	.10	7.47	.0015	.0070	.0016	.22	3.0
HAVERHILL	Johnson's Pond	.12	5.15	.0022	.0149	.0030	.36	2.3
	Crystal Lake	.13	4.03	.0012	.0127	.0018	.28	1.4
	Kenoza Lake	.11	5.03	.0029	.0160	.0034	.33	2.1
	Lake Saltonstall	.04	6.85	.0017	.0160	.0047	.52	3.2
	Pentucket Lake	.11	4.66	.0026	.0137	.0032	.33	2.0
	Millvale Reservoir	.55	5.88	.0023	.0145	.0023	.28	2.0
Hingham	Accord Pond	.09	3.71	.0017	.0097	.0009	.51	0.9
	Fulling Mill Pond	.79	6.31	.0084	.0229	.0057	.58	1.6
Hinsdale (Fire District)	Reservoir	.11	2.35	.0015	.0111	.0019	.10	1.0
HOLYOKE	Whiting Street Reservoir	.02	5.31	.0036	.0142	.0020	.21	2.9
	Fomer Reservoir	.20	3.91	.0029	.0136	.0030	.12	1.4
	Wright and Ashley Pond	.07	5.60	.0034	.0138	.0029	.15	2.7
	High Service Reservoir	.06	3.95	.0021	.0144	.0022	.14	1.9
	White Reservoir	.15	3.87	.0029	.0158	.0030	.12	1.7
	Gates Pond	.03	3.73	.0032	.0123	.0021	.19	1.3
Hudson								
Huntington (Fire Dis- trict)	Cold Brook Reservoir	.04	3.26	.0007	.0040	.0006	.11	1.3
Ipswich	Dow's Brook Reservoir	.19	5.77	.0027	.0104	.0017	.54	2.1
LAWRENCE	Merrimack River, filtered	.32	5.67	.0037	.0073	-	.53	1.4
Lee	Codding Brook Upper Reservoir	.12	4.37	.0010	.0068	.0008	.11	2.2
	Codding Brook Lower Reservoir	.16	4.55	.0013	.0089	.0012	.11	2.3
	Basin Pond Brook	.43	4.35	.0015	.0111	.0014	.11	1.7
Lenox	Reservoir	.02	7.30	.0005	.0057	.0006	.09	5.6
	Laurel Lake	.05	16.21	.0080	.0220	.0041	.23	13.9
LEOMINSTER	Morse Reservoir	.09	3.19	.0052	.0116	.0015	.16	0.7
	Haynes Reservoir	.13	3.13	.0083	.0136	.0026	.16	0.7
	Fall Brook Reservoir	.07	3.04	.0038	.0090	.0014	.16	0.8
Lincoln	Sandy Pond	.01	2.80	.0042	.0088	.0010	.32	1.1
Longmeadow	Cooley Brook	.04	5.56	.0057	.0109	.0044	.22	3.1
LYNN	Birch Reservoir	.03	5.15	.0042	.0148	.0025	.59	2.1
	Breed's Reservoir	.25	6.75	.0043	.0160	.0025	.56	2.8
	Walden Reservoir	.34	6.94	.0026	.0163	.0027	.59	2.9
	Hawkes Reservoir	.43	6.85	.0040	.0180	.0027	.58	2.9
Manchester	Gravel Pond	.08	4.31	.0019	.0113	.0014	.70	1.1
MARLBOROUGH	Lake Williams	.06	5.51	.0020	.0149	.0048	.49	2.1
	Milham Brook Reservoir	.33	5.02	.0031	.0138	.0024	.30	1.6
Maynard	White Pond	.09	3.12	.0011	.0103	.0024	.23	1.1

Averages of Chemical Analyses of Surface-Water Sources, etc. — Concluded.

[Parts in 100,000.]

CITY OR TOWN.	Source.	Color.	Residue on Evaporation.	AMMONIA.			Chlorine.	Hardness.
				Free.	ALBUMINOID.			
					Total.	Sus- pended.		
Milford	Charles River, filtered	.15	5.74	.0014	.0060	—	.27	2.8
Nantucket	Wannacomet Pond	.05	7.84	.0061	.0146	.0047	2.17	2.0
NEW BEDFORD	Little Quittacas Pond	.28	4.31	.0031	.0138	.0026	.41	1.3
	Great Quittacas Pond	.33	4.03	.0017	.0134	.0025	.43	1.1
NEWBURYPORT	Artichoke River	.32	7.93	.0167	.0273	.0065	.54	2.5
NORTH ADAMS	Notch Brook Reservoir	.01	7.47	.0036	.0050	.0008	.08	6.5
	Broad Brook	.05	4.48	.0024	.0054	.0008	.08	2.6
	Mount Williams Reservoir	.00	7.32	.0011	.0072	.0014	.08	4.8
NORTHAMPTON	Middle Reservoir	.23	4.75	.0033	.0100	.0015	.15	1.9
	Mountain Street Reservoir	.05	4.39	.0021	.0074	.0019	.11	1.9
North Andover	Great Pond	.11	4.95	.0029	.0140	.0032	.38	2.1
Northborough	Lower Reservoir	.42	5.07	.0094	.0227	.0076	.20	1.3
	Upper Reservoir	.48	4.95	.0042	.0200	.0053	.20	1.3
North Brookfield	Doane Pond	.31	4.12	.0052	.0190	.0033	.16	1.3
	North Pond	.30	3.92	.0048	.0183	.0035	.15	1.3
Northfield	Reservoir	.12	3.90	.0008	.0053	.0005	.10	1.4
Norwood	Buckmaster Pond	.09	5.00	.0077	.0152	.0029	.42	1.8
Orange	Reservoir	.04	3.60	.0007	.0048	.0009	.15	1.0
Palmer (Fire District No. 1)	Lower Reservoir	.14	4.25	.0025	.0138	.0026	.16	1.1
PEABODY	Spring Pond	.16	7.29	.0138	.0116	.0020	.61	2.6
	Suntaug Lake	.02	5.52	.0107	.0166	.0032	.83	2.7
PITTSFIELD	Ashley Lake	.19	4.40	.0070	.0148	.0042	.12	2.4
	Ashley Brook	.13	6.59	.0042	.0090	.0022	.12	4.7
	Hathaway Brook	.06	8.57	.0032	.0068	.0021	.12	7.6
	Mill Brook	.37	5.14	.0022	.0128	.0023	.10	2.2
	Sackett Brook	.12	8.44	.0029	.0072	.0010	.14	6.1
	Farnham Reservoir	.47	4.93	.0025	.0170	.0044	.11	1.8
Plymouth	Little South Pond	.01	3.37	.0010	.0123	.0020	.63	0.5
	Great South Pond	.00	3.12	.0020	.0111	.0029	.62	0.3
Randolph	Great Pond	.26	5.54	.0020	.0121	.0031	.52	1.6
Rockport	Cape Pond	.22	10.43	.0022	.0146	.0041	3.51	2.3
Russell	Black Brook	.09	3.82	.0010	.0070	.0005	.11	1.7
Rutland	Muschopauge Lake	.04	3.68	.0005	.0069	.0009	.32	1.6
SALEM	Wenham Lake	.30	8.06	.0059	.0163	.0032	.76	3.0
	Longham Reservoir	.78	7.77	.0095	.0233	.0041	.81	2.4
	Ipswich River at pumping station	1.22	12.16	.0213	.0240	.0066	.66	4.8
Shelburne (Shelburne Falls Fire District)	Fox Brook	.07	6.52	.0003	.0051	.0011	.13	3.7
Southbridge	Hatchet Brook Reservoir No. 3	.11	3.22	.0013	.0095	.0015	.14	1.0
	Hatchet Brook Reservoir No. 4	.16	3.47	.0037	.0125	.0033	.14	0.9
South Hadley (Fire District No. 1)	Leaping Well Reservoir	.00	2.95	.0010	.0084	.0002	.18	1.4
	Buttery Brook Reservoir	.10	4.50	.0022	.0090	.0016	.28	1.7
Spencer	Shaw Pond	.02	2.87	.0012	.0119	.0018	.16	0.9
SPRINGFIELD	Westfield Little River, filtered	.11	3.90	.0006	.0060	—	.11	1.4
Stockbridge	Lake Averie	.06	6.44	.0032	.0121	.0028	.13	4.8
Stoughton	Muddy Pond Brook	.07	4.18	.0011	.0064	.0014	.32	1.1
TAUNTON	Assawompsett Pond	.19	3.87	.0032	.0141	.0022	.41	0.9
	Elder's Pond	.05	3.51	.0021	.0123	.0018	.42	0.8
	Crystal Lake	.14	6.52	.0062	.0180	.0040	.70	2.5
Wakefield	Jonathan Pond	.00	3.13	.0015	.0089	.0016	.63	0.4
Wareham (Onset)	Snake Brook Reservoir	.58	5.32	.0044	.0177	.0024	.23	1.8
Wayland	Montgomery Reservoir	.40	4.05	.0093	.0178	.0036	.14	0.8
WESTFIELD	Tillotson Brook Reservoir	.05	3.47	.0033	.0052	.0013	.15	0.9
	Bear Hole Brook	.06	7.50	.0037	.0067	.0013	.15	4.2
West Springfield	Bear Hole Brook, filtered	.00	7.32	.0016	.0031	—	.17	4.2
	Great Pond	.27	3.86	.0008	.0138	.0025	.41	1.1
Weymouth	Reservoir	.06	5.62	.0013	.0078	.0011	.12	2.2
Williamsburg	Rattlesnake Brook	.03	9.61	.0005	.0046	.0014	.09	8.0
Williamstown	Paul Brook	.00	6.29	.0008	.0060	.0015	.10	4.5
Winchester	North Reservoir	.02	4.72	.0029	.0121	.0022	.35	1.8
	South Reservoir	.02	4.43	.0027	.0108	.0019	.34	1.6
	Middle Reservoir	.05	4.04	.0033	.0164	.0039	.36	1.7
WORCESTER	Bottomly Reservoir	.35	5.64	.0021	.0163	.0050	.22	2.1
	Kent Reservoir	.31	4.62	.0027	.0159	.0029	.16	1.6
	Leicester Reservoir	.15	3.99	.0023	.0116	.0021	.17	1.6
	Mann Reservoir	.21	4.16	.0025	.0122	.0017	.15	1.5
	Upper Holden Reservoir	.13	3.75	.0035	.0157	.0043	.17	1.2
	Lower Holden Reservoir	.10	3.77	.0045	.0140	.0040	.15	1.3
	Kendall Reservoir	.14	3.76	.0019	.0112	.0024	.18	1.3
	Pine Hill Reservoir	.26	5.80	.0020	.0131	.0026	.22	2.3

Averages of Chemical Analyses of Ground-Water Sources for the Year 1924.

[Parts in 100,000.]

CITY OR TOWN.	Source.	Color.	Residue on Evaporation.	AMMONIA.		Chlorine.	NITROGEN AS —		Hardness.	Iron.
				Free.	Albuminoid.		Nitrates.	Nitrites.		
Acton (West and South Water Supply District)	Tubular wells	.00	8.37	.0003	.0020	.41	.0957	.0000	3.4	.006
Adams (Fire District)	Tubular wells	.00	14.45	.0007	.0016	.11	.0370	.0000	11.1	.012
Amesbury	Tubular wells	.22	15.74	.0072	.0043	.41	.0115	.0000	8.0	.409
Ashland	Tubular wells, old supply	.05	10.55	.0022	.0029	1.55	.0065	.0000	4.1	.013
	Tubular wells, new supply	.00	6.15	.0005	.0036	.44	.0089	.0000	2.4	.009
ATTLEBORO	Wells	.00	5.68	.0006	.0045	.40	.0165	.0000	2.1	.017
Auburn	Tubular wells	.00	7.70	.0006	.0018	.53	.2350	.0000	3.6	.009
Avon	Wells	.00	7.62	.0004	.0021	.54	.2427	.0000	2.8	.009
Ayer	Large well	.00	8.03	.0009	.0017	.50	.0730	.0000	3.2	.010
	Tubular wells	.00	6.90	.0013	.0017	.34	.0187	.0001	2.6	.019
Barnstable	Tubular wells	.00	4.70	.0017	.0021	.98	.0043	.0000	1.2	.021
Bedford	Large well	.00	4.87	.0003	.0025	.28	.0072	.0001	2.0	.014
Billerica	Old wells	.06	11.01	.0013	.0036	.65	.0664	.0004	3.5	.242
	New wells	.04	11.63	.0016	.0034	.38	.0187	.0001	5.4	.065
Braintree	Filter-gallery	.00	13.90	.0025	.0076	1.33	.5067	.0002	5.0	.012
Bridgewater	Wells	.02	5.48	.0009	.0022	.60	.0385	.0000	1.7	.015
Brookline	Tubular wells and filter-gallery, filtered	.02	9.21	.0007	.0049	.70	.0329	.0000	4.3	.008
Canton	Springdale well	.00	5.50	.0006	.0026	.42	.0316	.0000	2.1	.007
	Well near Henry's Spring	.03	5.50	.0009	.0024	.44	.0412	.0001	1.9	.011
Chelmsford (North Chelmsford Fire District)	Tubular wells	.07	5.75	.0112	.0059	.45	.0775	.0011	2.2	.030
Chelmsford (Water District)	Tubular wells	.00	9.62	.0009	.0020	.68	.1650	.0009	3.4	.018
CHICOPEE (Fairview)	Tubular wells	.00	6.30	.0012	.0024	.32	.0716	.0001	2.1	.041
Cohasset	Tubular wells	.05	14.15	.0007	.0059	1.90	.2044	.0000	6.1	.007
	Dug well, filtered	.03	8.04	.0055	.0075	1.10	.0168	.0001	3.0	.011
Cummington	Tubular wells	.04	6.40	.0013	.0036	.10	.0087	.0000	4.0	.056
Dedham	Large well and tubular wells	.02	10.47	.0024	.0049	.96	.1263	.0001	4.4	.015
Deerfield (Fire District)	Wells	.00	6.38	.0005	.0018	.11	.0050	.0001	2.5	.006
Douglas	Tubular wells	.00	5.72	.0003	.0023	.36	.0815	.0000	2.1	.016
Dracut (Water Supply District)	Tubular wells	.00	12.35	.0006	.0022	.66	.1550	.0001	6.0	.016
Dracut (Collinsville)	Tubular wells	.02	5.27	.0007	.0027	.28	.0097	.0000	2.1	.016
Dudley	Tubular wells	.00	3.87	.0007	.0025	.21	.0077	.0000	1.6	.005
Dunstable	Well	.00	5.07	.0002	.0030	.17	.0120	.0001	1.8	.006
Duxbury (Fire and Water District)	Tubular wells	.00	3.77	.0008	.0031	.78	.0110	.0000	1.0	.012
East Brookfield	Tubular wells	.01	3.50	.0004	.0016	.20	.0083	.0001	1.3	.013
Easthampton	Tubular wells	.00	7.43	.0003	.0015	.14	.0220	.0000	4.0	.011
Easton (North Easton Village District)	Well	.00	6.19	.0004	.0024	.52	.1212	.0000	2.3	.010
Edgartown	Large well	.00	3.90	.0002	.0014	.93	.0053	.0000	0.4	.007
Fairhaven	Tubular wells	.23	8.18	.0009	.0081	.96	.0903	.0000	3.1	.013
Foxborough (Water Supply District)	Tubular wells	.00	5.85	.0007	.0025	.42	.0505	.0000	1.9	.020
Framingham	Filter-gallery	.00	14.18	.0144	.0040	1.95	.0407	.0014	6.3	.011
Franklin	Tubular wells	.00	4.90	.0004	.0019	.55	.0377	.0000	1.9	.007
Grafton	Filter-gallery	.03	11.02	.0004	.0047	1.08	.2325	.0000	4.6	.005
Granville	Well	.00	3.53	.0004	.0022	.10	.0060	.0000	1.4	.008
Greenfield	Well near Green River	.00	7.47	.0007	.0030	.10	.0047	.0000	4.4	.007
Groton	Large well	.00	6.80	.0007	.0025	.19	.0057	.0001	3.3	.007
Groton (West Groton Water Supply District)	Tubular wells	.00	5.55	.0011	.0017	.19	.0277	.0001	3.2	.030
Hingham	Wells	.06	5.93	.0014	.0048	.66	.0214	.0000	1.9	.011
Holliston	Large well	.31	4.69	.0025	.0127	.30	.0067	.0000	1.6	.033
Hopkinton	Tubular wells	.00	11.30	.0006	.0041	.77	.2200	.0001	5.0	.019
Kingston	Tubular wells	.00	4.83	.0005	.0034	.66	.0120	.0000	1.2	.008
Leicester (Water Supply District)	Wells	.00	5.80	.0007	.0027	.24	.0833	.0001	2.2	.013
Leicester (Cherry Valley and Rochdale Water District)	Wells	.16	5.43	.0027	.0096	.29	.0070	.0000	2.1	.006
Littleton	Tubular wells	.00	4.63	.0003	.0015	.16	.0157	.0000	1.9	.004
LOWELL	Boulevard wells (tubular)	.38	6.48	.0294	.0061	.34	.0274	.0001	2.4	.252
	Boulevard wells, filtered	.01	5.91	.0006	.0034	.39	.0352	.0000	2.2	.018

Averages of Chemical Analyses of Ground-Water Sources, etc. — Continued.

[Parts in 100,000.]

CITY OR TOWN.	Source.	Color.	Residue on Evaporation.	AMMONIA.		Chlorine.	NITROGEN AS —		Hardness.	Iron.
				Free.	Albuminoid.		Nitrates.	Nitrites.		
Manchester	Wells	.00	11.55	.0007	.0018	1.75	.1378	.0001	4.5	.018
Mansfield (Water Supply District)	Large well	.01	5.10	.0005	.0031	.29	.0348	.0000	1.5	.013
Marblehead	Inlet of filter	.05	17.32	.0085	.0037	1.72	.0068	.0001	8.5	.151
	Outlet of filter	.01	17.70	.0024	.0043	1.59	.0088	.0000	8.8	.014
	Well	.00	22.22	.0006	.0033	4.59	.0236	.0001	9.7	.010
Marion	Tubular wells	.00	5.10	.0004	.0014	.63	.0442	.0000	1.6	.007
Marshfield	Tubular wells at Humarock Beach	.00	7.20	.0006	.0014	1.84	.0350	.0001	2.1	.005
	Wells at Brant Rock	.00	52.60	.0008	.0022	22.00	.0780	.0001	12.8	.097
Mattapoisett	Tubular wells	.00	6.57	.0011	.0028	.88	.0750	.0000	2.6	.013
Medfield	Spring	.00	3.83	.0021	.0033	.28	.0193	.0000	1.6	.004
Medway	Wells	.00	6.92	.0016	.0023	.69	.0400	.0000	2.8	.010
Merrimac	Tubular wells	.00	8.83	.0007	.0017	.47	.0223	.0000	3.4	.009
Methuen	Tubular wells at Harris Brook	.26	8.53	.0051	.0080	.43	.0328	.0001	3.3	.088
	Tubular wells at Pine Island	.00	8.52	.0005	.0027	.71	.1111	.0003	4.2	.011
Middleborough (Fire District)	Well	.32	6.75	.0099	.0062	.51	.0363	.0000	2.5	.327
	Filtered Water	.05	5.82	.0008	.0040	.53	.0362	.0001	2.2	.024
Millbury	Well	.00	5.25	.0006	.0035	.31	.0655	.0000	2.4	.015
Millis	Spring	.00	11.45	.0004	.0017	.86	.2883	.0000	5.0	.005
Monson	Large well	.04	4.42	.0005	.0021	.17	.0060	.0000	1.3	.006
Monterey	Springs	.00	9.20	.0003	.0031	.09	—	—	7.1	.013
Natick	Large well	.00	11.23	.0007	.0029	.93	.0578	.0000	5.5	.007
Needham	Wells	.00	8.10	.0013	.0027	.64	.1465	.0000	2.8	.009
	Hicks Spring	.00	9.90	.0005	.0022	.87	.3833	.0000	3.3	.004
NEWBURYPORT	Wells and Artichoke River, filtered	.10	7.07	.0009	.0109	.59	.0283	.0000	2.8	.034
NEWTON	Tubular wells and filter-gallery	.02	6.52	.0024	.0035	.46	.0413	.0006	2.7	.014
North Attleborough	Wells	.00	5.83	.0006	.0017	.45	.0307	.0000	2.6	.036
Northbridge	Tubular wells	.00	4.55	.0007	.0024	.27	.0112	.0000	1.3	.006
Norton	Tubular wells	.00	5.00	.0002	.0017	.33	.0060	.0000	1.6	.011
Norwood	Tubular wells	.07	10.49	.0103	.0055	.54	.0565	.0002	5.0	.085
Oak Bluffs	Springs	.00	4.80	.0005	.0015	.94	.0137	.0000	1.0	.017
Oxford	Tubular wells	.00	5.05	.0002	.0021	.35	.0590	.0000	1.9	.003
Palmer (Bondsville)	Tubular wells	.00	6.03	.0005	.0013	.28	.0343	.0000	2.6	.008
Pepperell	Tubular wells	.00	4.30	.0003	.0013	.18	.0060	.0000	1.6	.006
Provincetown	Tubular wells	.00	17.82	.0005	.0017	7.54	.0075	.0000	3.9	.030
Reading	Filter-gallery	.61	9.64	.0157	.0111	1.03	.0114	.0000	3.0	.246
	Filtered water	.20	17.24	.0009	.0060	.90	.0085	.0002	7.9	.040
Salisbury	Old well	.13	6.96	.0007	.0044	.52	.0084	.0000	3.0	.020
	New well	.04	9.97	.0005	.0021	.52	.0060	.0000	5.0	.037
Scituate	Tubular wells	.00	15.09	.0004	.0015	2.61	.2286	.0000	5.4	.011
Sharon	Well	.00	17.67	.0006	.0017	3.10	.4225	.0000	7.8	.006
	Tubular wells	.00	5.57	.0004	.0013	.54	.0585	.0000	2.2	.007
Sheffield	Spring	.00	4.00	.0000	.0010	.12	.0080	.0000	2.1	.004
Shirley (Shirley Village Water District)	Well	.00	5.02	.0003	.0016	.42	.1445	.0000	1.6	.004
Shrewsbury	Tubular wells	.00	5.44	.0003	.0020	.39	.0284	.0000	2.0	.009
South Hadley (Fire District No. 2)	Large well	.00	4.80	.0005	.0015	.15	.0580	.0000	1.5	.008
Sunderland	Springs	.00	7.37	.0003	.0021	.14	.0047	.0000	4.5	.009
Tisbury	Well	.00	4.60	.0003	.0023	.98	.0055	.0000	0.7	.002
Uxbridge	Tubular wells	.00	5.60	.0006	.0021	.47	.0823	.0000	1.9	.009
Walpole	Tubular wells	.03	6.00	.0007	.0023	.36	.0383	.0000	2.3	.039
WALTHAM	Old well	.04	9.32	.0030	.0031	.68	.0242	.0000	4.1	.039
	New well	.00	7.76	.0007	.0033	.51	.0289	.0000	3.5	.006
Ware	Wells	.00	9.43	.0011	.0020	.69	.2517	.0001	3.7	.020
	Large well	.06	8.44	.0009	.0049	.54	.1901	.0000	3.2	.017
Wareham (Fire District)	Tubular wells	.00	3.80	.0007	.0013	.56	.0047	.0000	1.2	.008
Warren	Tubular wells	.00	3.65	.0004	.0013	.21	.0260	.0000	1.3	.007
Webster	Wells	.00	4.53	.0007	.0018	.30	.0190	.0000	2.1	.007
Wellesley	Tubular wells	.00	10.52	.0008	.0028	1.02	.0535	.0000	4.4	.015
	Well at Williams Spring	.00	13.25	.0017	.0029	.89	.2285	.0001	5.3	.010
	Filter-gallery	.00	9.93	.0005	.0036	1.06	.0625	.0000	4.3	.008
Westborough	Filter basin	.00	3.61	.0013	.0079	.25	—	—	1.4	.010
West Brookfield	Tubular wells	.00	4.50	.0006	.0015	.25	.0443	.0000	1.7	.008
Westford	Tubular wells	.00	5.53	.0003	.0007	.20	.0120	.0000	2.2	.008
Weston	Well at Warren Ave.	.20	7.45	.0009	.0083	.47	.0205	.0000	3.3	.009
	Tubular wells at Kendal Green	.00	8.10	.0004	.0028	.59	.0865	.0000	2.9	.006
Williamstown	Cold Spring	.00	13.40	.0005	.0025	.10	.0382	.0000	13.7	.005
	Sherman Spring	.00	9.77	.0011	.0050	.08	.0140	.0000	7.2	.006

Averages of Chemical Analyses of Ground-Water Sources, etc. — Concluded.

[Parts in 100,000.]

CITY OR TOWN.	Source.	Color.	Residue on Evaporation.	AMMONIA.		Chlorine.	NITROGEN AS —		Hardness.	Iron.
				Free.	Albu- minoid.		Nitrates.	Nitrites.		
Winchendon . . .	Old wells . . .	.07	4.47	.0010	.0020	.14	.0055	.0000	1.3	.037
	New wells . . .	.24	3.95	.0004	.0058	.12	.0062	.0000	1.3	.017
Woburn . . .	Filter-gallery . . .	.00	10.67	.0008	.0033	1.24	.0523	.0000	5.7	.007
Worthington (Fire Dis- trict) . . .	Springs . . .	.00	2.80	.0007	.0021	.11	.0070	.0000	1.9	.015
Wrentham . . .	Tubular wells . . .	.00	4.63	.0005	.0021	.27	.0243	.0000	1.6	.008

CONSUMPTION OF WATER.

Records of the consumption of water determined either by pumping records or by meter measurements are kept in a large majority of the cities and towns of the State and these observations are presented in the table which follows. The consumption of water per person as given in this table has been obtained by dividing the average daily quantity used by the estimated total population of the municipality supplied, the estimates of population usually being a pro-rata increase based on the rate of increase from 1915 to 1920. The per capita consumption of water estimated in this way is in most cases somewhat less than the actual amount used by the portion of the population supplied, since in most cities and towns the water supply is not available to all of the inhabitants. There are other cases where the consumption of water per person is greatly increased by the large quantities of water used for industrial purposes and still others where a large population not included in the census uses considerable water, especially during the summer months. As a general thing, water consumption for industrial purposes has been comparatively low in 1924 on account of the depression of many important industries.

The available records are given in the following table:

Average Daily Consumption of Water in Various Cities and Towns in 1924.

CITY OR TOWN.	Esti- mated Popu- lation.	Gallons.	Gallons per Inhabit- ant.	CITY OR TOWN.	Esti- mated Popu- lation.	Gallons.	Gallons per Inhabit- ant.
Metropolitan Water District ¹ . . .	1,245,779	124,099,700	100	Avon . . .	2,186	111,000	51
Arlington . . .	21,686	1,395,000	64	Ayer . . .	3,270	255,000	78
Belmont . . .	12,883	887,200	69	Barnstable . . .	4,836	214,000	44
Boston . . .	750,157	87,680,900	117	Bedford . . .	1,362	67,000	49
Chelsea . . .	43,184	3,551,700	82	Beverly . . .	22,561	1,452,000	64
Everett . . .	42,042	4,491,500	107	Billerica . . .	3,966	306,000	77
Lexington . . .	7,000	448,000	64	Braintree . . .	11,570	938,000	81
Malden . . .	49,260	2,859,900	58	Bridgewater . . .	8,438	335,000	40
Medford . . .	45,861	2,441,400	53	Brockton . . .	69,427	3,376,000	49
Melrose . . .	19,263	1,247,400	65	Brookline . . .	41,154	3,969,000	96
Milton . . .	10,008	537,000	54	Cambridge . . .	110,392	11,713,000	106
Nahant . . .	1,318	195,800	149	Canton . . .	6,203	431,000	69
Quincy . . .	53,638	4,352,400	81	Chelmsford . . .	6,082	155,000	25
Revere . . .	31,739	2,293,300	72	Clinton . . .	12,979	1,041,000	80
Somerville . . .	98,081	7,760,100	79	Concord . . .	6,461	719,000	111
Stoneham . . .	8,180	600,900	73	Danvers and Middle- ton . . .	12,303	1,496,000	122
Swampscott . . .	8,706	731,100	84	Dartmouth . . .	7,423	98,000	13
Watertown . . .	25,411	1,657,100	65	Dedham . . .	10,792	808,000	75
Winthrop . . .	17,613	969,000	55	Dracut . . .	6,286	126,000	20
Abington and Rock- land . . .	13,820	530,000	38	Dudley . . .	3,701	192,000	52
Acton . . .	2,170	127,000	59	Duxbury . . .	1,553	126,000	81
Acushnet . . .	3,625	71,000	20	East Bridgewater . . .	3,486	159,000	46
Agawam . . .	5,397	125,000	23	East Brookfield . . .	—	33,000	—
Amesbury . . .	11,230	605,000	54	Easthampton . . .	12,394	834,000	67
Amherst . . .	5,550	631,000	114	East Longmeadow . . .	2,682	48,000	18
Andover . . .	8,500	923,000	109	Easton . . .	5,041	287,000	57
Ashburnham . . .	2,012	86,000	43	Fairhaven . . .	8,102	390,000	48
Ashland . . .	2,513	216,000	86	FALL RIVER . . .	120,485	6,788,000	56
Athol . . .	9,800	919,000	94	Falmouth . . .	3,500	491,000	140
Attleboro . . .	20,731	1,069,000	52	Fitchburg . . .	42,127	4,575,000	109
Auburn ² . . .	4,379	12,000	3	Foxborough . . .	4,441	410,000	92
				Framingham . . .	17,971	1,243,000	69

¹ Figures for Metropolitan consumption are exclusive of Newton and are based entirely on meter readings. Records based on pumpage will vary slightly from the above.

² Only small part of town supplied.

Average Daily Consumption of Water in Various Cities and Towns in 1924
—Concluded.

CITY OR TOWN.	Esti- mated Popu- lation.	Gallons.	Gallons per Inhabit- ant.	CITY OR TOWN.	Esti- mated Popu- lation.	Gallons.	Gallons per Inhabit- ant.
Franklin	6,543	447,000	68	Orange	5,404	164,000	30
Gardner	17,447	822,000	47	PEABODY	20,294	3,685,000	182
GLOUCESTER . . .	22,947	1,722,000	75	Pepperell	2,468	150,000	61
Grafton	7,397	111,000	15	PITTSFIELD . . .	43,488	6,221,000	143
Greenfield	17,737	1,505,000	85	Plymouth	13,140	1,429,000	109
Groton	2,185	252,000	115	Provincetown . .	4,246	350,000	82
Groveland	2,868	66,000	23	Randolph and Hol-			
HAVERHILL	57,431	5,530,000	96	brook	8,105	584,000	72
Holliston	2,707	108,000	40	Reading	7,946	327,000	41
HOLYOKE	60,203	7,043,000	117	Rockport	3,878	291,000	75
Ipswich	6,201	426,000	69	SALEM	46,792	5,404,000	115
LAWRENCE	97,478	4,623,000	47	Salisbury	1,701	171,000	101
Lenox	2,691	300,000	111	Saugus	11,392	636,000	56
Lincoln	1,042	227,000	218	Scituate	2,534	395,000	156
Littleton	1,316	43,000	33	Sharon	2,467	264,000	107
LOWELL	116,584	6,542,000	56	Shirley	2,268	80,000	35
Ludlow	8,445	211,000	25	Shrewsbury . . .	4,439	192,000	43
LYNN	101,824	7,946,000	78	Southbridge . . .	14,267	822,000	58
Manchester	2,466	351,000	142	SPRINGFIELD . .	150,928	13,519,000	90
Mansfield	6,641	436,000	66	Stockbridge . . .	1,764	228,000	129
Marblehead	7,324	661,000	90	Stoughton	6,865	419,000	61
Marion	1,288	140,000	109	TAUNTON	37,918	3,533,000	93
MARLBOROUGH . .	15,028	732,000	49	Tisbury	1,275	201,000	158
Mattapoisett . . .	1,277	95,000	74	Uxbridge	5,754	463,000	80
Maynard	7,339	318,000	43	Wakefield	13,220	739,000	56
Medfield	3,595	75,000	21	Walpole	5,446	816,000	150
Medway	3,044	158,000	52	WALTHAM	31,524	2,159,000	68
Merrimac	2,231	120,000	54	Ware	8,525	371,000	44
Methuen	16,135	1,121,000	69	Wareham	4,415	216,000	49
Middleborough . .	8,453	360,000	43	Warren ²	3,467	45,000	13
Milford and Hopedale	16,248	911,000	56	Webster	13,812	745,000	54
Millbury	5,939	356,000	60	Wellesley	6,224	657,000	106
Montague and Erving	8,970	807,000	90	West Bridgewater .	3,042	144,000	47
Nantucket ¹	2,797	329,000	118	West Brookfield .	1,281	39,000	30
Natick	10,907	688,000	63	WESTFIELD	18,758	2,392,000	128
Needham	7,388	499,000	68	Westford	3,432	171,000	50
NEW BEDFORD . . .	130,536	9,522,000	73	Weston	2,282	166,000	73
NEWBURYPORT . .	15,864	1,365,000	86	West Springfield .	15,126	2,113,000	140
NEWTON	48,407	4,109,000	85	West Stockbridge ²	1,058	4,000	4
North Andover . .	6,512	481,000	74	Westwood ² . . .	1,358	24,000	18
North Attleborough .	9,238	603,000	65	Weymouth	15,927	1,167,000	73
Northbridge . . .	10,910	958,000	88	Whitman	7,147	266,000	37
North Brookfield .	2,610	400,000	153	WOBURN	16,705	2,227,000	133
Norton	2,374	142,000	60	WORCESTER . . .	193,400	16,234,000	84
Norwood	13,947	1,102,000	79	Wrentham	3,123	101,000	32
Oak Bluffs	1,047	168,000	160				

¹ Does not include supply for Siasconset.

² Only small part of town supplied.

RAINFALL.

The average rainfall in the State as a whole in the year 1924 was 36.79", or 7.75" below the normal as indicated by available records. There were rather wide variations, however, in different sections of the State from a deficiency of some 4" in parts of Berkshire County and 6" in the central and northern portions of the State, to more than 10" in the Connecticut valley and in some of the southeastern sections. The areas receiving the most rain during the year were the eastern portion of Essex County, the southern part of Plymouth County, the western part of Barnstable County, a small area in the central and southern parts of Worcester County, and the high lands of Berkshire County.

The seasonal distribution shows an excess of precipitation during the months of January, April, August and September, the greatest excess occurring in the latter month. Deficiencies have occurred in the other months, the most marked being in October when very little rain fell in any part of the State. The rainfall of August and September was about $\frac{1}{3}$ of the total precipitation for the year, but in October, November and December there was a deficiency of nearly 7".

The following table shows the normal rainfall, the rainfall for the year 1924, and the excess or deficiency of the precipitation in each month as compared with the normal.

MONTH.	Normal Rainfall (Inches).	Rainfall in 1924 (Inches).	Excess or Deficiency in 1924 (Inches).	MONTH.	Normal Rainfall (Inches).	Rainfall in 1924 (Inches).	Excess or Deficiency in 1924 (Inches).
January	3.79	4.01	+0.22	August	4.17	5.28	+1.11
February	3.64	2.71	-0.93	September	3.47	5.79	+2.32
March	3.95	2.17	-1.78	October	3.64	0.10	-3.54
April	3.70	5.48	+1.78	November	3.87	2.36	-1.51
May	3.61	3.04	-0.57	December	3.68	1.97	-1.71
June	3.29	1.72	-1.57				
July	3.73	2.16	-1.57	Totals	44.54	36.79	-7.75

FLOW OF STREAMS.

Sudbury River.

The average yield of the Sudbury River during the year 1924 was 841,000 gallons per day per square mile of drainage area or about 14% below the normal yield for the past fifty years. The yield was above the normal in the months of January, April, May and September and less than the normal in the other eight months. The month of April yielded the greatest excess and the month of February the greatest deficiency.

The average yield for the six driest months, July to December inclusive, was 152,000 gallons per day per square mile or about 59½ per cent below the normal yield for the driest six months during the past fifty years.

In order to show the relation between the yield of the Sudbury River during each month of the year 1924 and the normal yield of the stream as deduced from observations during the fifty year period from 1875 to 1924 inclusive, the following table has been prepared. The drainage area of the Sudbury River above the point of measurement is 75.2 square miles.

Table showing the Average Daily Yield of the Sudbury River for Each Month in the Year 1924, in Cubic Feet per Second per Square Mile of Drainage Area, and in Million Gallons per Day per Square Mile of Drainage Area; also, Departure from the Normal.

MONTH.	NORMAL YIELD.		ACTUAL YIELD IN 1924.		EXCESS OR DEFICIENCY.	
	Cubic Feet per Second per Square Mile.	Million Gallons per Day per Square Mile.	Cubic Feet per Second per Square Mile.	Million Gallons per Day per Square Mile.	Cubic Feet per Second per Square Mile.	Million Gallons per Day per Square Mile.
January	1.764	1.140	2.779	1.796	+1.015	+0.656
February	2.410	1.558	1.106	0.715	-1.304	-0.843
March	4.212	2.723	3.002	1.941	-1.210	-0.782
April	3.097	2.002	4.728	3.056	+1.631	+1.054
May	1.730	1.118	2.164	1.399	+0.434	+0.281
June	0.798	0.516	0.434	0.281	-0.364	-0.235
July	0.316	0.204	-0.081	-0.052	-0.397	-0.256
August	0.337	0.218	0.179	0.116	-0.158	-0.102
September	0.356	0.230	0.632	0.408	+0.276	+0.178
October	0.584	0.377	0.010	0.006	-0.574	-0.371
November	1.116	0.721	0.256	0.166	-0.860	-0.555
December	1.470	0.950	0.424	0.274	-1.046	-0.676
Average for whole year	1.511	0.977	1.301	0.841	-0.210	-0.136

The following table gives the rainfall upon the Sudbury River watershed and the total yield expressed in inches in depth upon the watershed (inches of rainfall collected) for each of the past six years, from 1919 to 1924, inclusive, together with the average for a period of fifty years, from 1875 to 1924:

Rainfall, in Inches, received and collected on the Sudbury River Drainage Area.

MONTH.	1919.			1920.			1921.			1922.		
	Rain-fall.	Rain-fall col-lected.	Per Cent col-lected.	Rain-fall.	Rain-fall col-lected.	Per Cent col-lected.	Rain-fall.	Rain-fall col-lected.	Per Cent col-lected.	Rain-fall.	Rain-fall col-lected.	Per Cent col-lected.
January	3.52	2.329	66.1	3.26	.556	17.1	2.78	1.742	62.7	1.89	.577	30.5
February	3.40	1.477	43.4	1.239	19.1	1.239	4.10	1.361	33.2	3.25	1.316	40.5
March	4.79	4.916	102.7	4.45	9.262	207.9	2.72	4.050	148.8	5.35	4.587	85.7
April	2.93	2.957	101.0	5.19	5.017	96.6	5.30	1.973	37.2	1.63	3.371	207.1
May	4.60	2.301	50.0	3.45	3.292	95.6	3.23	2.957	91.6	5.39	3.126	58.0
June	1.86	.193	10.4	6.67	2.929	43.9	3.82	.295	7.7	8.90	2.695	30.3
July	5.47	.533	9.8	2.04	.506	24.9	6.86	1.822	26.6	3.21	1.287	40.1
August	3.75	.164	4.4	1.78	-.070	-4.0	1.20	.105	8.7	4.85	.627	12.9
September	5.28	1.232	23.3	3.53	.110	3.1	1.88	-.099	-5.3	4.09	1.135	27.7
October	2.16	.498	23.1	1.01	-.046	-4.6	1.12	-.175	-15.6	2.28	.486	21.3
November	5.90	2.202	37.3	5.68	1.154	20.3	7.95	1.152	14.5	1.34	.639	47.8
December	1.98	1.952	98.6	5.11	2.141	41.9	2.54	1.367	53.8	3.42	.730	21.4
Totals and averages	45.64	20.754	45.5	48.66	26.090	53.6	43.50	16.550	38.0	45.60	20.576	45.1

*Rainfall, in Inches, received and collected on the Sudbury River Drainage Area—
Concluded*

MONTH.	1923.			1924.			MEAN FOR FIFTY YEARS, 1875-1924.		
	Rain-fall.	Rain-fall col-lected.	Per Cent col-lected.	Rain-fall.	Rain-fall col-lected.	Per Cent col-lected.	Rain-fall.	Rain-fall col-lected.	Per Cent col-lected.
January	7.64	2.779	36.4	3.60	3.205	89.1	4.01	2.034	50.7
February	2.31	1.507	65.3	2.56	1.193	46.7	4.06	2.532	62.3
March	3.25	5.659	173.9	2.66	3.462	130.0	4.27	4.858	113.8
April	5.35	4.197	78.4	5.49	5.268	96.1	3.65	3.456	94.7
May	1.01	2.099	207.3	3.22	2.495	77.6	3.30	1.955	60.5
June	4.12	0.668	16.2	1.49	.485	32.5	3.27	.891	27.3
July	2.94	0.118	4.0	3.19	-0.094	-2.9	3.68	0.364	9.9
August	2.17	-0.130	-6.0	4.73	0.207	4.4	3.77	0.389	10.3
September	1.54	-0.099	-6.5	5.67	0.706	12.4	3.41	0.397	11.7
October	5.71	0.707	12.4	0.11	0.011	10.0	3.56	0.673	18.9
November	5.83	1.969	33.8	2.51	0.286	11.4	3.80	1.245	32.8
December	4.96	3.921	79.1	1.73	0.489	28.4	3.74	1.696	45.3
Totals and averages	46.83	23.395	50.0	36.96	17.713	47.9	44.52	20.530	46.1

The following table gives the record of the yield of the Sudbury River watershed for each of the past six years and the mean for fifty years, the yield being expressed in gallons per day per square mile of watershed:

Yield of the Sudbury River Drainage Area in Gallons per Day per Square Mile.¹

MONTH.	1919.	1920.	1921.	1922.	1923.	1924.	Mean for Fifty Years, 1875-1924.
January	1,306,000	312,000	976,000	323,000	1,558,000	1,796,000	1,140,000
February	917,000	743,000	845,000	817,000	935,000	715,000	1,558,000
March	2,759,000	5,192,000	2,270,000	2,571,000	3,172,000	1,941,000	2,723,000
April	1,713,000	2,911,000	1,144,000	1,956,000	2,435,000	3,056,000	2,002,000
May	1,290,000	1,846,000	1,658,000	1,753,000	1,177,000	1,399,000	1,118,000
June	112,000	1,696,000	171,000	1,561,000	387,000	281,000	516,000
July	299,000	284,000	1,021,000	722,000	67,000	-52,000	204,000
August	92,000	-39,000	59,000	351,000	-73,000	116,000	218,000
September	713,000	64,000	-58,000	657,000	-57,000	408,000	230,000
October	279,000	-26,000	-98,000	272,000	397,000	6,000	377,000
November	1,275,000	669,000	667,000	370,000	1,140,000	166,000	721,000
December	1,095,000	1,200,000	766,000	409,000	2,198,000	274,000	950,000
Average for whole year	988,000	1,239,000	788,000	980,000	1,114,000	841,000	977,000
Average for driest six months	458,000	360,000	294,000	463,000	307,000	152,000	376,000

¹ The drainage area of the Sudbury River used in making up these records included water surfaces amounting to about 2 per cent of the whole area from 1875 to 1878, inclusive, subsequently increasing by the construction of storage reservoirs to about 3 per cent in 1879, to 3.5 per cent in 1885, to 4 per cent in 1894, and to 6.5 per cent in 1898. The drainage area also contains extensive areas of swampy land, which, though covered with water at times, are not included in the above percentages of water surfaces.

Nashua River.

The average yield of the South Branch of the Nashua River at the outlet of the Wachusett Reservoir, Clinton, during the year 1924 was 1,035,000 gallons per day per square mile of drainage area or about 6 per cent below the normal for the past 28 years. The yield of this watershed in 12 of these 28 years was less than in 1924. The yield in the months of January, April and May was in excess of the normal, the greatest excess occurring in the month of April. Deficiencies occurred during the months of February and March and all of the months from June to December, inclusive. The greatest deficiency occurred in March and the least in September, following the high rainfall during August and September. The average yield for the six driest months from July to December, inclusive, was 239,000 gallons per day per square mile or about 56 per cent below the normal yield for that period during the past 28 years. Lower yields have been recorded in that period of the year, in 3 of the past 28 years.

In order to show the relation between the yield of the Nashua River during each month of the year 1924 and the normal yield of that stream as deduced from observations for the twenty-eight year period 1897-1924 inclusive, the following table has been prepared. The drainage area of the Nashua River above the point of measurement was 119 square miles from 1897 to 1907 and 118.19 square miles from 1908 to 1913 inclusive. Since Jan. 1, 1914, the city of Worcester has been diverting water from 9.35 square miles of this drainage area for the supply of that city, leaving the net drainage area 108.84 square miles. In the calculations of yield, allowance has been made for water overflowing from the Worcester area.

Table showing the Average Daily Yield of the South Branch of the Nashua River for Each Month in the Year 1924, in Cubic Feet per Second per Square Mile of Drainage Area, and in Million Gallons per Day per Square Mile of Drainage Area; also, Departure from the Normal.

MONTH.	NORMAL YIELD.		ACTUAL YIELD IN 1924.		EXCESS OR DEFICIENCY.	
	Cubic Feet per Second per Square Mile.	Million Gallons per Day per Square Mile.	Cubic Feet per Second per Square Mile.	Million Gallons per Day per Square Mile.	Cubic Feet per Second per Square Mile.	Million Gallons per Day per Square Mile.
January	1.853	1.198	2.902	1.876	+1.049	+ .678
February	2.017	1.304	1.235	0.798	- .782	- .506
March	4.119	2.663	2.626	1.697	-1.493	- .966
April	3.496	2.260	6.518	4.213	+3.022	+1.953
May	2.074	1.341	3.052	1.973	+ .978	+ .632
June	1.285	0.831	0.695	0.449	- .590	- .382
July	0.751	0.485	0.203	0.131	- .548	- .354
August	0.618	0.399	0.390	0.252	- .228	- .147
September	0.547	0.354	0.494	0.320	- .053	- .034
October	0.696	0.450	0.099	0.064	- .597	- .386
November	1.173	0.758	0.427	0.276	- .746	- .482
December	1.773	1.146	0.609	0.394	-1.164	- .752
Average for whole year	1.699	1.098	1.601	1.035	- .098	- .063

The following table gives the rainfall upon the Nashua River watershed and the total yield expressed in inches in depth upon the watershed (inches of rainfall collected) for each of the past six years, from 1919 to 1924, inclusive, together with the average for the past twenty-eight years:

Rainfall, in Inches, received and collected on the Nashua River Drainage Area.

MONTH.	1919.			1920.			1921.		
	Rain-fall.	Rain-fall collected.	Per Cent collected.	Rain-fall.	Rain-fall collected.	Per Cent collected.	Rain-fall.	Rain-fall collected.	Per Cent collected.
January	3.23	2.392	74.1	3.17	1.153	36.4	2.67	2.521	94.3
February	3.51	1.279	36.5	6.26	1.210	19.3	4.07	1.719	42.2
March	5.27	5.621	106.7	4.26	8.356	196.0	2.87	4.477	156.1
April	2.57	2.954	115.0	6.13	6.031	98.4	6.51	3.329	51.1
May	6.06	3.931	64.9	4.01	3.695	92.1	3.01	3.695	123.0
June	2.01	.798	39.6	6.07	3.317	54.6	3.75	.828	22.1
July	5.00	.713	14.3	4.33	1.443	33.3	6.41	1.821	28.4
August	4.17	.467	11.2	2.91	.584	20.1	1.94	.438	22.6
September	6.78	1.887	27.8	6.39	.931	14.6	2.35	.197	8.4
October	2.35	.884	37.6	.63	.731	116.1	2.00	.282	14.1
November	6.01	3.168	52.7	5.49	2.246	40.9	7.31	1.366	18.7
December	2.09	2.305	110.4	6.01	4.619	76.9	2.77	2.271	82.1
Totals and averages	49.05	26.399	53.8	55.66	34.316	61.7	45.66	22.944	50.3

*Rainfall, in Inches, received and collected on the Nashua River Drainage Area —
Concluded.*

MONTH.	1922.			1923.			1924.			MEAN FOR TWENTY- EIGHT YEARS, 1897-1924.		
	Rain- fall.	Rain- fall col- lected.	Per Cent col- lected.	Rain- fall.	Rain- fall col- lected.	Per Cent col- lected.	Rain- fall.	Rain- fall col- lected.	Per Cent col- lected.	Rain- fall.	Rain- fall col- lected.	Per Cent col- lected.
January	2.40	1.058	44.0	7.95	3.146	39.6	4.23	3.346	79.2	3.69	2.137	57.8
February	3.77	1.624	43.0	2.30	1.617	70.5	3.31	1.332	40.3	3.82	2.117	55.5
March	6.21	5.960	96.0	3.29	5.478	166.3	2.41	3.028	125.6	4.04	4.749	117.7
April	2.19	4.108	187.6	5.52	5.244	95.0	6.58	7.262	110.4	3.97	3.901	98.4
May	4.78	3.511	73.5	1.44	2.339	162.1	3.55	3.519	99.0	3.39	2.391	70.5
June	9.22	3.838	41.6	3.51	1.062	30.3	1.13	.775	68.4	3.87	1.434	37.0
July	4.91	2.672	54.5	3.72	.529	14.2	2.60	.234	9.0	4.13	.866	20.9
August	5.59	1.419	25.4	2.04	.264	12.9	4.61	.449	9.7	4.01	.712	17.8
September	2.77	.891	32.2	1.04	.159	15.3	4.79	.552	11.5	3.68	.611	16.6
October	2.41	.774	32.1	5.16	.766	14.9	0.09	.114	122.5	3.11	.803	25.8
November	1.59	.912	57.3	5.87	1.682	28.7	3.30	.476	14.4	3.62	1.309	36.1
December	4.02	.987	24.5	5.07	3.062	60.4	2.03	.702	34.6	3.98	2.045	51.4
Totals and aver- ages	49.86	27.754	55.7	46.91	25.348	54.0	38.63	21.789	56.4	45.31	23.075	50.9

The following table gives a record of the yield of the Nashua River for each of the past six years and the mean for the past twenty-eight years, the yield being expressed in gallons per day per square mile of watershed:

Yield of the Nashua River Drainage Area in Gallons per Day per Square Mile.¹

MONTH.	1919.	1920.	1921.	1922.	1923.	1924.	Mean for Twenty- eight Years, 1897-1924.
January	1,341,000	646,000	1,413,000	593,000	1,764,000	1,876,000	1,198,000
February	794,000	725,000	1,067,000	1,008,000	1,004,000	798,000	1,304,000
March	3,155,000	4,685,000	2,510,000	3,341,000	3,071,000	1,697,000	2,663,000
April	1,711,000	3,498,000	1,931,000	2,383,000	3,042,000	4,213,000	2,260,000
May	2,204,000	2,071,000	2,071,000	1,968,000	1,311,000	1,973,000	1,341,000
June	462,000	1,922,000	480,000	2,223,000	615,000	449,000	831,000
July	400,000	809,000	1,021,000	1,498,000	297,000	131,000	485,000
August	262,000	327,000	246,000	795,000	148,000	252,000	399,000
September	1,093,000	540,000	114,000	516,000	92,000	320,000	355,000
October	495,000	409,000	158,000	434,000	430,000	64,000	450,000
November	1,835,000	1,301,000	791,000	528,000	974,000	276,000	758,000
December	1,292,000	2,590,000	1,273,000	553,000	1,717,000	394,000	1,146,000
Average for whole year	1,257,000	1,629,000	1,092,000	1,321,000	1,207,000	1,035,000	1,098,000
Average for driest six months	752,000	870,000	468,000	723,000	424,000	239,000	546,000

Merrimack River.

The flow of the Merrimack River has been measured for many years at Lawrence, above which city the river has a total drainage area of 4,663 square miles which includes 118.19² square miles tributary to the South Branch of the Nashua River, 75 square miles on the Sudbury River, and 18 square miles tributary to Lake Cochituate, or a combined area of 211 square miles from which water is drawn at the present time for the supply of the Metropolitan Water District. The flow as measured at Lawrence includes the water wasted from these drainage areas, the aggregate quantity of which in the wet months of the year is considerable, but which becomes very small in the dry months. Records of the quantity of water wasted from the Sudbury and Nashua River reservoirs have been kept by the Metropolitan District Commission, and its predecessors, and these quantities have been deducted from the flow of the Merrimack River as measured at Lawrence. In presenting the record of the flow of the river, these three drainage areas have been deducted so that the net drainage area above Lawrence was 4,567 square miles in 1880, 4,570 square miles in the years 1881 to 1897, inclusive, and 4,452 square miles since the latter year.

¹ The drainage area used in making up these records included water surfaces amounting to 2.2 per cent of the whole area from 1897 to 1902, inclusive, to 2.4 per cent in 1903, to 3.6 per cent in 1904, to 4.1 per cent in 1905, to 5.1 per cent in 1906, to 6 per cent in 1907, to 7 per cent in 1908, 1909 and 1910, to 6.5 per cent in 1911, to 6.8 per cent in 1912, to 7 per cent in 1913, to 7.4 per cent in 1914 and 1915, to 7.6 per cent in 1916, to 7.4 per cent in 1917 and 1918, to 7.5 per cent in 1919, 1920, 1921 and 1922, and 7.4 per cent in 1923 and 1924.

² Including 9.35 square miles from which water is drawn for the supply of the city of Worcester.

The average flow of the Merrimack River during the year 1924 amounted to 1.435 cubic feet per second, or 927,000 gallons per day per square mile of drainage area, or about 2.5 per cent below the normal flow for the past 45 years for which records are available. The flow was in excess of the normal in the months of January, April, May and September, and less than the normal in the other eight months of the year.

In order to show the relation between the flow of this stream during each month of the year 1924 and the normal flow as deduced from observations during 45 years, from 1880 to 1924, inclusive, the following table has been prepared.

Table showing the Average Monthly Flow of the Merrimack River at Lawrence for the Year 1924, in Cubic Feet per Second per Square Mile of Drainage Area; also, Departure from the Normal.

MONTH.	Normal Flow, 1880-1924.	Actual Flow in 1924.	Excess or Deficiency.
January	1.278	1.964	+ .686
February	1.342	.978	— .364
March	2.754	1.767	— .987
April	3.541	5.050	+1.509
May	2.263	3.115	+ .852
June	1.270	.920	— .350
July . . . . .	.765	.464	— .301
August . . . . .	.651	.350	— .301
September . . . . .	.644	.753	+ .109
October . . . . .	.792	.612	— .180
November	1.093	.536	— .557
December	1.272	.712	— .560
Average for whole year	1.472	1.435	— .037

The following table gives the record of the flow of the Merrimack River at Lawrence for each of the past six years and the mean for forty-five years, the flow being expressed in cubic feet per second per square mile of drainage area:

Flow of the Merrimack River at Lawrence in Cubic Feet per Second per Square Mile.

MONTH.	1919.	1920.	1921.	1922.	1923.	1924.	Mean for Forty-five Years, 1880-1924.
January	1.314	.570	1.679	.830	1.074	1.964	1.278
February . . . . .	.872	.618	.995	.887	.855	.978	1.342
March	3.383	4.082	3.689	3.900	1.956	1.767	2.754
April	2.542	6.002	2.700	4.903	4.958	5.050	3.541
May	2.741	3.545	1.957	2.887	2.904	3.115	2.263
June	1.007	1.607	.597	3.006	.730	.920	1.270
July . . . . .	.539	.746	1.031	2.111	.434	.464	.765
August . . . . .	.401	.678	.683	.773	.394	.350	.651
September . . . . .	.653	.680	.425	.766	.303	.753	.644
October . . . . .	.699	1.051	.475	.660	.491	.612	.792
November	1.648	.921	1.057	.612	1.177	.536	1.093
December	1.331	3.258	1.652	.498	2.372	.712	1.272
Average for whole year	1.427	1.980	1.412	1.819	1.471	1.435	1.472
Average for driest six months . . . . .	.825	.947	.711	.903	.588	.571	.869

Sudbury, Nashua and Merrimack Rivers.

The following table shows the weekly fluctuations during the year 1924 in the yield of the Sudbury River at Framingham and the South Branch of the Nashua River at the outlet of the Wachusett Reservoir, Clinton, and the flow of the Merrimack River at Lawrence. The flow of these streams, particularly that of the Sudbury River and of the South Branch of the Nashua River, serves to indicate the flow of other streams in eastern Massachusetts. The area of the Sudbury River watershed is 75.2 square miles, of the South Branch of the Nashua River 118.19 square miles, and of the Merrimack River 4,452 square miles.

Table showing the Average Weekly Flow of the Sudbury, South Branch of the Nashua and the Merrimack Rivers for the Year 1924, in Cubic Feet per Second per Square Mile of Drainage Area.

WEEK ENDING SUNDAY —	Yield of Sudbury River.	Yield of South Branch, Nashua River.	Flow of Merrimack River.	WEEK ENDING SUNDAY —	Yield of Sudbury River.	Yield of South Branch, Nashua River.	Flow of Merrimack River.
Jan. 6	2.636	1.915	1.314	July 6	— .092	.192	.498
13	3.132	3.745	1.609	13	— .111	.374	.464
20	3.870	4.348	3.136	20	— .103	.087	.478
27	2.257	1.999	2.100	27	— .268	.065	.462
Feb. 3	1.721	1.803	1.237	Aug. 3	— .043	.208	.356
10	1.348	1.595	1.086	10	— .085	.419	.318
17 . . . . .	.888	1.078	.946	17	— .149	.581	.367
24 . . . . .	.967	1.133	.863	24	— .066	.021	.351
Mar. 2 . . . . .	.692	.842	.889	31 . . . . .	.851	.730	.415
9	1.587	1.467	1.058	Sept. 7 . . . . .	.412	.636	.483
16	3.416	2.347	1.636	14 . . . . .	.951	.633	1.315
23	2.887	1.993	1.591	21 . . . . .	.286	.230	.698
30	4.801	4.878	2.856	28 . . . . .	.249	.230	.539
Apr. 6	4.659	6.255	2.928	Oct. 5 . . . . .	.434	.482	1.012
13	8.306	11.257	7.622	12 . . . . .	.145	.066	.630
20	3.880	5.631	4.823	19	— .153	.015	.469
27	3.170	4.284	5.274	26	— .053	.118	.442
May 4	2.175	2.991	3.783	Nov. 2	1.216	.145	.396
11	1.855	2.711	3.461	9	— .060	.107	.352
18	3.569	5.153	4.214	16 . . . . .	.128	.217	.366
25	1.791	2.374	2.334	23 . . . . .	.209	.715	.342
June 1	1.299	1.521	1.758	30 . . . . .	.707	.795	1.196
8 . . . . .	.921	1.123	1.458	Dec. 7 . . . . .	.434	.593	.563
15 . . . . .	.505	.634	.827	14 . . . . .	.689	1.118	1.128
22 . . . . .	.269	.611	.713	21 . . . . .	.543	.469	.694
29 . . . . .	.097	.457	.624	28 . . . . .	.255	.389	.518

EXAMINATION OF RIVERS.

Aberjona River.

The results of the analyses of samples of water from the Aberjona River during the past year have shown a marked increase in the amount of putrescible organic matter present throughout much of the course of this stream, and in parts of its course its condition was offensive in the drier portion of the year. Under date of September 16 the Department issued the following order relating to this river:

"The Department of Public Health, acting under the authority of chapter 291 of the Acts of the year 1911, hereby prohibits the entrance or discharge of sewage into any part of the Aberjona River, or its tributaries, and the entrance or discharge therein of every other substance which might be injurious to public health or might tend to create a public nuisance."

Copies of this order were served on the officials of the various industries from which polluting wastes were being discharged into the stream or its tributaries. Subsequently, the Department, as provided in the act, has advised the management of each of the various industries as to the best practicable and reasonably available means in its opinion of rendering the industrial wastes therefrom harmless.

While by the action of the Department as above outlined some measure of relief will doubtless be obtained, the Department is of the opinion that the most effective and satisfactory plan for preventing the pollution of the Aberjona River will be to construct a sewer in this valley within the limits of the city of Woburn to connect with a metropolitan sewer already available for the purpose in accordance with the plan recommended by the Department in House document No. 1216 of the year 1920.

Assabet River.

The effect of the pollutions which this river receives have been more serious throughout its course below Westborough than for many years. This increase in pollution was due in part to the overflow of sewage from disposal works at Westborough and the pumping station at Hudson and in part to the discharge of industrial waste into the river at Maynard and elsewhere along its course.

Blackstone River.

The Blackstone River immediately below Worcester has shown more evidence of pollution than in any previous year for many years, but the increase has not been particularly marked in the lower portion of its course. During the year the city of Worcester has diligently continued the construction of its new sewage disposal works, which were nearing completion at the end of the year. The legislature of 1924 in Chapter 141 extended the time for the completion of the new sewage disposal works at Worcester until July 1, 1925. The expenditures required by the act have been made, and it is probable that the new works or a large portion of them can be placed in operation before the time prescribed in the act.

Charles River.

There has been a marked increase in the pollution of the upper waters of the Charles River and serious complaint has been made regarding its condition. Analyses show that the condition of the river immediately below Milford has been very objectionable. Mine Brook below Franklin also shows an increase in pollution. Lower down in the course of the Charles River the conditions have not been greatly different from those of previous years, though the quantity of organic matter present in the water at the Brookline water works had been greater than usual.

Complaint was made during the latter part of the year of the discharge of oil into the river and especially in regard to an excessive growth of microscopic organisms in the lower portions of its course, a condition which is a development of recent years, having been noted last year for the first time. It is probably caused by the pollution which the river receives, the effect of which has been intensified by the depleted flow of the river due to a less than average rainfall and the great and increasing drafts of water from this watershed for water supply purposes.

Chicopee River.

The analyses of the water of the Quaboag River show no material change during the year, but inspections of Chicopee Brook below Monson during the latter part of the year indicated a marked increase in pollution especially by industrial waste.

The Ware River below Barre and above Ware shows less evidence of pollution than last year, but below Ware and at the mouth the pollution in the drier part of the year has been more serious than for many years.

Concord and Sudbury Rivers.

The Sudbury River below Saxonville in the town of Framingham still shows evidence of serious pollution, due chiefly to the discharge of industrial waste into the stream from that village, and was the subject of complaint during the past year. The condition of the Concord River has not been objectionable down to the village of North Billerica. Below this point the river has been the subject of a special investigation during the year under the authority of Chapter 269 of the Acts of 1924, the results of which are presented to the Legislature in a separate document.

Connecticut River.

Examinations of the Connecticut River have shown an increase in pollution at some points as compared with earlier years.

Mill River at its mouth still shows evidence of serious pollution by the sewage of the city of Northampton, and the Manhan River at its mouth also shows evidence of serious pollution by the sewage of Easthampton.

Deerfield River.

In 1923 complaint was made relative to the pollution of the Deerfield River by certain waste from the treatment of pulp at a mill in Vermont. This source of pollution has been remedied, however, and no further complaint was made during the past year.

French River.

The condition of the French River has been very objectionable below Webster due to the sewage and industrial wastes discharged from the sewers and mills in that town and in the adjacent town of Dudley. Investigations relative to the construction of a sewage disposal works have been continued during the past year.

Hoosick River.

The condition of the Hoosick River below Adams has been very objectionable during the past year. The North Branch above North Adams has shown more evidence of pollution than in any previous year. The repeated recommendations of the Department for the construction of works for the treatment of the sewage of Adams and North Adams have not yet been carried out.

Housatonic River.

The Housatonic River below Pittsfield has shown more evidence of pollution than for a number of years due largely to the overflow of sewage from the Pittsfield sewerage system. Sewage has been found overflowing at the pumping station at practically all of the examinations made by the Department during the year, and the effect of this sewage is noticeable for a long distance down stream. At its mouth the river was in a more objectionable condition at the time of the examinations than in any previous year.

Merrimack River.

The waters of the Merrimack River as indicated by numerous analyses during the months from June to November, inclusive, show evidence of a continued increase in pollution, especially below Lawrence, as compared with previous years. The Shawsheen River at the mouth has shown a slight improvement due to the removal of sewage from the town of Andover to an outlet into the Merrimack River.

Millers River.

A decided increase in pollution has been noted in the Millers River below Gardner during the past year, the results of the analyses showing much more serious pollution than in any year since observations of its condition were begun many years ago. This pollution is due largely to the ineffective operation of the Gardner sewage disposal works.

Nashua River.

The North Branch of the Nashua River below Fitchburg but above the sewage disposal works has shown more evidence of pollution than for many years, and the condition of the river has been on the whole more objectionable than in any year since the sewerage system and sewage disposal works were constructed. Monoosnock Brook, which receives the bulk of the sewage of the city of Leominster, has been as usual grossly polluted below that city. Below Monoosnock Brook the North Branch of the Nashua River has been more seriously polluted than in any year since the sewage disposal works at Fitchburg were installed. The South Branch of the Nashua River at its mouth has continued to show evidence of serious pollution during the past year, due largely to the overflow of sewage from the Clinton sewerage system and to the discharge of poorly purified effluent from the Clinton sewage disposal works.

The Nashua River below the confluence of the two branches has shown more evidence of pollution than in any year since the observations of its condition were begun many years ago, while at the mouth the river has been more seriously polluted than in any year since the sewage disposal works of Fitchburg were put into operation in 1914.

The condition of the Nashua River has been the cause of complaint, and a special investigation of the various mills on this stream was instituted in 1923. This work is still under way and shows that the two main branches of the river are badly polluted by industrial waste from Fitchburg and Leominster and by sewage from Fitchburg, Leominster and Clinton. The condition of this river is very objectionable.

Neponset River.

Inspections and analyses have shown a slight increase in the pollution of the Neponset River above East Walpole, while immediately below the paper mills in this district the river has been in about the same condition as in 1923.

The results of the analyses of samples of water from Hawes Brook at the mouth have shown slightly less evidence of pollution than in the last few years, and the same is true of the main stream below Hawes Brook and above the entrance of the Canton River. Nevertheless, the river in this portion of its course has been

very badly polluted and the subject of serious complaint. At the lower end of the Fowls Neck the water of the river has contained more putrescible organic matter than for many years, and the amount of dissolved oxygen present at this point was very low throughout the drier part of the year, the river being devoid of oxygen at this point in July. At the mouth the analyses show more evidence of pollution than in any year since 1912.

Taunton River.

The condition of the Taunton River and its principal tributaries has on the whole shown little change as compared with other recent years, though below Taunton the examinations show that the effects of pollution continue to increase.

EXAMINATION OF SEWAGE DISPOSAL WORKS.

The new sewer for conveying the sewage of Andover, including that of Shawshen Village to the Merrimack River, has been in operation during the year, and the Andover sewage disposal works have been abandoned.

The sewage disposal works of the city of Attleboro are ample for the effective treatment and satisfactory purification of all the sewage of the city. Changes are desirable in the method of operating the works which will secure a better distribution of the sewage over the entire area. The sewage delivered at the filtration area has become slightly stronger, but with the proper distribution of the sewage no difficulty is likely to be experienced in its efficient purification.

At Brockton the new disposal works consisting of a series of four settling tanks and two acres of trickling filters have been used for the filtration of practically all of the sewage throughout the year. The old sand beds have been used comparatively little for sewage, but considerable quantities of trickling filter effluent have been refiltered through these beds. The quantity of sewage delivered to the filters during the year has been less than usual.

The quantity of sewage discharged upon the filter beds at Clinton has at times been greater than the filters are capable of caring for satisfactorily, and considerable quantities of sewage have overflowed at times into the South Branch of the Nashua River. The condition of this plant has shown no improvement as compared with the conditions found in 1923.

At Framingham new Imhoff tanks and eight acres of new sand filters were completed and their operation begun during the summer. The sewerage system of the town has been extended during the year to Framingham Centre and Saxonville, and the system now provides for the most thickly settled portions of the town. The new filter beds have been used for the disposal of a considerable part of the sewage delivered at the works during the year.

The Franklin sewage disposal works have not been operated to the best advantage during the year, and there has been some complaint of objectionable odors due to the removal of sludge from the settling tanks. A more thorough distribution of the sewage to all of the filters and more care in the removal of sludge from the settling tanks are necessary at these works.

The condition of the sewage disposal works at Gardner has remained much the same as in previous years. The purification of the sewage has not been as satisfactory as at other works, and the river below these filters has been considerably polluted by effluent therefrom. An improvement of these works and in the efficiency of their operation is necessary.

At Hudson the sewage disposal works appear to be adequate for the proper treatment of the sewage, but, nevertheless, a considerable quantity of sewage was discharged into the Assabet River during the spring and again in the latter part of the year.

At Milford additional sewage disposal works consisting of Imhoff tanks and a trickling filter with an area of .29 of an acre were put into operation in July, and a large part of the sewage of the town has been treated by the new works since that time. The secondary tank has not yet been completed, however, and although the capacity of the works for treating the sewage of the town has been materially increased, nevertheless much poorly purified sewage has been discharged directly into the Charles River, and the stream has been badly polluted below Milford.

At Natick the conditions remain about the same as in previous years. The

filters are inadequate for the treatment of all the sewage of the town and are not only badly overloaded but much sewage has been allowed to overflow directly into Bannister Brook without treatment. An improvement of the sewers and an enlargement of the disposal works of this town are greatly needed and should be made without further delay.

The sewage disposal works at Pittsfield are inadequate for the effective treatment of the sewage discharged from the city, and much of it has been allowed to overflow into the Housatonic River. In the latter part of the year, while changes in the pumping machinery were in progress, large quantities of sewage were discharged continually into the river which had a very injurious effect on the stream.

At Southbridge the condition of the sewage disposal works has not been improved, and much sewage has been allowed to overflow into the Quinebaug River without treatment as has been the case in other recent years. Investigations for improvement in the disposal works have been begun, and it is essential that additional works be provided at the earliest practicable time.

At Worcester the construction of the new disposal works has been carried on during the year, and it is expected that the works will be practically completed in the summer of 1925.

The average results of the analyses of samples of sewage and effluent, together with statistics concerning the more important sewage disposal works in the State, are presented in the following tables:

TABLE No. 1. — *Average Results of the Analyses of Monthly Samples of Sewage as received at the Disposal Works. (Fats determined in about 60.4 Per Cent of the Samples.)*

[Parts in 100,000.]

CITY OR TOWN.	RESIDUE ON EVAPORATION.						AMMONIA.				Chlorine.	OXYGEN CONSUMED.		IRON.		Kjeldahl Nitrogen.	Fats.
	TOTAL RESIDUE.			LOSS ON IGNITION.			FREE.	ALBUMINOID.		Unfil-tered.		Fil-tered.	Unfil-tered.	Fil-tered.			
	Total.	Dis-solved.	Sus-pended.	Total.	Dis-solved.	Sus-pended.											
ATTEBORO ¹	62.63	38.35	24.28	32.00	14.60	17.40	3.99	.70	.39	31	6.85	5.48	2.98	.630	.311	1.62	3.50
BROCKTON ²	64.04	43.95	20.09	34.20	18.28	15.92	5.15	.84	.41	43	8.57	7.66	4.04	.154	.073	1.70	7.89
Clinton ²	145.55	84.29	61.26	79.82	39.13	40.69	3.10	1.25	.75	50	6.48	15.35	9.12	.230	.104	2.62	29.60
Concord ¹	34.92	26.32	8.60	17.94	10.98	6.96	2.03	.37	.23	14	4.63	3.43	2.31	.103	.063	.81	8.35
Easthampton ¹	65.67	42.60	23.07	36.94	16.52	20.42	3.25	.50	.26	24	8.08	5.63	2.93	.120	.050	1.27	-
FRANKFORD	47.98	31.72	16.26	23.05	13.40	9.65	2.20	.47	.24	23	5.23	4.68	2.76	.447	.159	1.10	6.10
Framingham ²	86.95	53.53	33.42	44.25	21.37	22.88	4.95	1.15	.61	54	12.03	8.97	4.19	.316	.089	2.50	18.36
Franklin ¹	33.38	27.90	5.48	12.63	8.50	4.13	1.94	.30	.18	12	5.55	2.40	1.47	.075	.040	.82	-
Gardner (Gardner Area) ³	109.50	59.30	50.20	70.50	27.45	43.05	7.87	1.89	1.00	89	10.10	11.55	5.08	.230	.068	3.32	18.44
Gardner (Templeton Area)	77.92	44.97	32.95	46.47	18.55	27.92	7.14	1.21	.67	54	8.12	7.80	3.68	.195	.072	2.55	9.54
Hopedale ^{2, 4}	119.12	46.22	72.90	64.28	19.98	44.30	7.74	1.64	.79	85	9.08	12.42	3.60	.336	.054	3.35	-
Hudson ²	60.52	41.56	18.96	30.34	15.20	15.04	5.03	.35	.35	35	9.80	5.82	2.68	.132	.069	1.50	7.44
Leicester ³	40.00	30.70	9.30	23.10	16.10	7.00	3.60	.55	.40	15	4.08	5.05	2.80	.142	.052	1.20	-
Marion ¹	34.86	29.60	8.26	13.72	9.38	4.34	1.63	.32	.18	14	9.04	2.36	1.33	.088	.034	.66	11.80
MARLBOROUGH	79.22	50.39	28.83	42.98	18.69	24.29	3.88	.86	.45	41	9.34	7.05	3.71	.283	.099	1.70	13.76
Milford ⁶	75.28	43.36	31.92	44.14	17.16	26.98	5.49	.83	.34	49	7.69	6.01	3.66	.167	.069	1.85	-
Natick	51.08	39.86	11.22	21.00	12.50	8.50	3.12	.46	.22	24	8.62	3.54	1.68	.142	.078	1.05	3.53
North Attleborough ¹	29.77	26.43	3.34	13.57	10.82	2.75	1.72	.35	.20	15	4.37	2.43	1.31	.140	.064	.80	-
Northbridge ¹	41.17	30.30	10.87	24.27	15.20	9.07	4.53	.84	.48	36	3.58	5.55	2.95	.107	.050	1.64	-
Norwood	68.46	52.16	16.30	28.52	16.48	12.04	3.28	.62	.32	30	13.25	6.13	3.70	.156	.062	1.36	6.72
PRITTSFIELD ^{2, 6}	42.34	35.65	6.69	19.23	14.44	4.79	3.03	.45	.28	17	5.20	3.92	2.48	.070	.039	.96	3.59
Southbridge ⁶	61.08	41.53	19.55	31.17	15.02	16.15	5.63	.66	.28	38	8.86	4.94	2.43	.149	.059	1.60	8.30
Spencer ¹	45.62	33.67	11.95	24.94	15.10	9.84	3.05	.32	.28	32	5.92	5.28	3.37	.144	.076	1.52	4.91
Stockbridge ³	24.40	22.15	2.25	11.20	9.28	1.92	1.49	.23	.16	07	2.20	2.06	1.54	.038	.023	.46	-
Westborough ³	68.88	54.12	14.76	31.18	21.14	10.04	2.27	.54	.35	24	5.00	8.08	5.92	.153	.079	1.29	10.09
WORCESTER (day) ⁵	86.68	57.30	29.38	35.38	14.50	20.88	2.78	.68	.24	44	10.79	8.43	3.18	3.130	.307	1.76	-
WORCESTER (night) ⁷	90.99	61.40	29.59	36.49	15.53	20.96	1.58	.55	.17	38	8.35	9.13	3.50	6.861	3.447	1.55	-

¹ Six Samples.

² At pumping station.

³ Four Samples.

⁴ Five Samples.

⁵ Seven samples.

⁶ Eight samples.

⁷ Nine samples.

⁸ Ten samples.

TABLE No. 2. — Average Results of the Analyses of Monthly Samples of Sewage as applied to Filter Beds after Preliminary Treatment as indicated. (Fats determined in about 60.4 Per Cent of the Samples.)

[Parts in 100,000.]

CITY OR TOWN.	Form of Preliminary Treatment.	RESIDUE ON EVAPORATION.				AMMONIA.				OXYGEN CONSUMED.		IRON.		Kjeldahl Nitrogen.	Fats.	
		TOTAL RESIDUE.		LOSS ON IGNITION.		Free.	ALBUMINOID.			Chlorine.	Unfiltered.	Filtered.	Unfiltered.			Filtered.
		Total.	Dissolved.	Suspended.	Total.		Dissolved.	Suspended.								
ATTLEBORO ¹	None	62.63	38.35	24.28	32.00	14.60	17.40	3.99	.70	.39	.31	6.85	5.48	2.98	1.62	3.50
BROCKTON	Tanks	36.12	32.22	3.90	14.22	11.18	3.04	2.94	.40	.20	.20	6.89	5.43	2.98	.311	3.05
CLINTON	Basins	63.87	55.97	7.90	30.89	24.91	5.98	2.66	.67	.42	.25	5.08	6.81	5.22	1.23	10.68
CONCORD ¹	None	34.92	26.32	8.60	17.94	10.98	6.96	2.03	.37	.23	.14	4.63	3.43	2.31	1.03	8.35
EASTHAMPTON ¹	Tanks	56.28	38.20	18.08	28.81	13.53	15.28	3.83	.50	.25	.25	7.88	4.07	2.08	.088	—
FITCHBURG	Imhoff	33.45	27.74	5.71	13.52	10.13	3.39	2.21	.30	.20	.10	5.17	3.26	2.54	.328	2.88
FRAMINGHAM	None	86.95	53.53	33.42	44.25	21.37	22.88	4.95	1.15	.61	.54	12.03	8.97	4.19	.316	18.36
FRANKLIN ¹	Tanks	29.50	25.82	3.68	11.00	10.13	.87	2.74	.27	.16	.11	3.92	1.97	1.47	.084	—
GARDNER (Gardner Area) ²	None	109.50	59.30	50.20	70.50	27.45	43.05	7.87	1.89	1.00	.89	10.10	11.55	5.08	.230	3.32
GARDNER (Templeton Area)	Tanks	43.26	36.14	7.12	19.36	13.07	6.29	3.92	.49	.25	.24	7.44	3.16	2.27	1.145	18.44
HOPEDALE ³	Tanks	44.44	33.50	10.94	21.84	12.52	9.32	4.90	.54	.32	.22	6.48	4.08	2.38	.137	—
HUDSON	Tanks	46.59	37.19	9.40	20.69	12.93	7.76	3.91	.50	.28	.22	8.15	3.52	2.30	.113	5.35
LEICESTER ²	None	40.00	30.70	9.30	23.10	16.10	7.00	3.60	.55	.40	.15	4.08	5.05	2.80	.142	1.20
MARION ³	None	34.86	29.60	5.26	13.72	9.38	4.34	1.63	.32	.18	.14	9.04	2.36	1.33	.088	11.80
MALBOROUGH	Tanks	51.74	44.76	6.98	20.06	15.30	5.66	4.02	.52	.28	.24	9.66	4.15	2.86	.212	5.47
MILFORD ⁵	Tanks and Imhoff.	44.98	38.65	6.33	19.18	13.86	5.32	4.04	.45	.25	.20	7.37	3.34	2.53	.113	—
NATICK	None	51.08	39.86	11.22	21.00	12.50	8.50	3.12	.46	.22	.24	8.62	3.54	1.88	.132	3.53
NORTH ATTLEBOROUGH ¹	Tanks	30.60	24.37	6.23	13.13	8.33	4.80	1.83	.32	.18	.14	4.45	1.98	1.36	.079	—
NORTHBRIDGE	Tanks	20.25	16.23	4.02	9.20	6.55	2.65	2.08	.28	.18	.10	2.72	1.97	1.28	.083	.70
NORWOOD	Tank	93.98	54.74	39.24	44.87	15.96	28.91	3.52	.83	.32	.51	15.35	7.32	3.29	.206	—
PITTSFIELD ⁵	None	42.34	35.65	6.69	19.23	14.44	4.79	3.03	.45	.28	.17	5.20	3.92	2.48	.070	11.36
SOUTHBRIDGE ⁴	Tanks	51.20	41.17	10.03	23.36	15.26	8.10	4.62	.44	.23	.21	8.79	3.76	2.28	.183	3.59
SPENCER ¹	None	45.62	33.67	11.95	24.94	15.10	9.84	3.05	.59	.32	.27	5.92	5.28	3.37	.144	5.66
STOCKBRIDGE ²	None	24.40	22.15	2.25	11.20	9.28	1.92	1.49	.23	.16	.07	2.20	2.06	1.54	.038	4.91
WESTBOROUGH ⁶	None	68.88	54.12	14.76	31.18	21.14	10.04	2.27	.54	.35	.19	5.00	8.08	5.92	.153	—
WORCESTER (day) ⁴	Tanks	86.68	57.30	29.38	35.38	14.50	20.88	2.78	.68	.24	.44	10.79	8.43	3.18	1.330	10.09
															.307	—

¹ Six samples.

² Four samples.

³ Five samples.

⁴ Seven samples.

⁵ Eight samples.

⁶ Ten samples.

¹ Six samples.

² Four samples.

³ Five samples.

⁴ Seven samples.

⁵ Eight samples.

⁶ Ten samples.

TABLE No. 3. — *Efficiency of Settling Tanks and Other Forms of Preliminary Treatment as Indicated by the Foregoing Tables.*
 [Parts in 100,000.]

CITY OR TOWN.	Form of Preliminary Treatment.	SUSPENDED SOLIDS.			TOTAL ALBUMINOID AMMONIA.			OXYGEN CONSUMED.			FATS. ¹		CHLORINE.	
		Raw Sewage.	Settled or Treated Sewage.	Per Cent removed.	Raw Sewage.	Settled or Treated Sewage.	Per Cent removed.	Raw Sewage.	Settled or Treated Sewage.	Per Cent removed.	Raw Sewage.	Settled or Treated Sewage.	Raw Sewage.	Settled or Treated Sewage.
BROOKTON	Tanks	20.90	3.90	81	.84	.40	52	7.66	2.83	63	7.89	3.05	8.57	6.89
CLINTON	Basins	61.29	7.90	87	1.25	.67	46	15.35	6.81	56	29.60	10.68	6.48	5.08
EASTHAMPTON	Tanks	23.07	18.08	22	.50	.50	00	5.63	4.07	28	-	-	8.08	7.88
FITCHBURG	Imhoff	16.26	5.71	65	.47	.30	36	4.68	3.26	30	6.10	2.88	5.23	5.17
FRANKLIN	Tanks	5.48	3.68	33	.30	.27	10	2.40	1.97	18	-	-	5.55	3.92
GARDNER (Templeton Area)	Tanks	32.95	7.12	78	1.21	.49	60	7.80	3.16	60	9.54	4.41	8.12	7.44
HOPEDALE	Tanks	72.90	10.94	85	1.64	.54	67	12.43	4.08	67	-	-	9.08	6.48
HUDSON	Tanks	18.98	9.40	50	.70	.50	29	5.82	3.52	40	7.44	5.35	9.80	8.15
MALBOROUGH	Tanks	28.83	6.98	76	.86	.52	40	7.03	3.15	41	13.76	5.47	9.34	9.66
MILFORD	Tanks	31.92	6.33	80	.83	.45	46	6.01	3.54	41	-	-	7.69	7.37
NORTH ATTLEBOROUGH	Tanks	3.34	6.23	-	.35	.32	9	2.43	1.98	19	-	-	4.37	4.45
NORBRIDGE	Tanks	10.87	4.02	63	.84	.28	67	5.55	1.97	65	-	-	3.58	2.72
NORWOOD	Tank	16.30	39.24	-	.62	.83	-	6.13	7.32	-	6.72	11.36	13.25	15.35
SOUTHBRIDGE	Tanks	19.56	10.03	49	.66	.44	33	4.94	3.76	24	8.30	5.66	8.86	8.79
WORCESTER	Chemical Precipitation	29.59	6.20	79	.55	.23	58	9.13	3.54	61	-	-	8.35	8.29

¹ Fats determined in about 60.4 per cent of the samples.

TABLE No. 4. — *Average Results of the Analyses of Monthly Samples of Sewage applied to the Trickling Filters at Brockton and Fitchburg, and of their Effluents, Per Cents removed, etc.*

[Parts in 100,000.]

Brockton.

	RESIDUE ON EVAPORATION.						AMMONIA.				Chlorine.	NITROGEN AS —		OXYGEN CONSUMED.		Kjeldahl Nitrogen.	Fats.	REMARKS.
	TOTAL RESIDUE.			LOSS ON IGNITION.			Free.	ALBUMINOID.				Nitrates.	Nitrites.	Unfiltered.	Filtered.			
	Total.	Dissolved.	Suspended.	Total.	Dissolved.	Suspended.												
Settled sewage as applied to trickling filter.	36.12	32.22	3.90	14.22	11.18	3.04	2.94	.40	.20	.20	—	—	2.83	1.89	.84	3.05	Trickling filter has an area of 2.0 acres and a depth of 10 feet of stone from 1.5 to 3 inches in size.	
Effluent from trickling filter.	41.21	35.44	5.77	15.81	11.91	3.90	1.65	.25	.10	.15	7.86	.0290	2.56	1.34	.65	1.85	One-half of filter used alternately. The average rate of operation was about 1,141,000 gallons per acre per day.	
Per cent removed by tank.	—	—	—	—	—	—	.44	.38	.50	.25	—	—	10	29	23	39	Period of sedimentation averages about 1.45 hours.	
Settled effluent from trickling filter.	43.60	39.15	4.45	15.42	12.40	3.02	2.09	.24	.11	.13	9.14	.0277	2.57	1.51	.61	1.44	Tanks cleaned forty-four times.	
Per cent removed by tank.	—	—	23	2	—	23	—	—	—	13	—	—	—	—	6	22		
Per cent removed by trickling filter and settling tank.	—	—	—	—	—	0.6	29	38	45	35	—	—	9	20	27	53		

Fitchburg.

Imhoff tank effluent as applied to trickling filter.	33.45	27.74	5.71	13.52	10.13	3.39	2.21	.30	.20	.10	—	—	3.26	2.54	.81	2.88	Trickling filter has an area of 2.14 acres and a depth of 10 feet of stone from 1 to 3 inches in size.
Effluent from trickling filter.	32.84	27.93	4.91	13.03	10.61	2.42	.45	.12	.06	.06	1.3166	.0063	1.49	.87	.38	—	The average rate of operation was about 1,934,000 gallons per day for area used (1.86).
Settled effluent from trickling filter.	2	—	14	4	—	29	80	60	70	40	—	—	54	66	.53	—	Period of sedimentation averages about 1 hour.
Per cent removed by tank.	30.57	26.48	4.09	12.22	10.18	2.04	.50	.12	.06	.06	1.3962	.0074	1.39	.90	.33	—	Tanks cleaned 6 times.
Per cent removed by settling tank.	7	5	17	6	4	16	—	00	00	00	3	—	7	—	13	—	
Per cent removed by trickling filter and settling tanks.	9	5	28	10	—	40	77	60	70	40	—	—	57	65	59	—	

TABLE NO. 5. — *Average Results of Analyses of Monthly Samples of Effluent from Sand Filters.*

[Parts in 100,000.]

CITY OR TOWN.	Free Ammonia.	Total Albuminoid Ammonia.	Chlorine.	NITROGEN AS —		Iron.
				Nitrates.	Nitrites.	
Attleboro ¹	.71	.0483	6.25	.7903	.0168	.067
Brockton ²	2.31	.0632	6.58	.4936	.0078	1.007
Clinton ²	1.37	.0824	4.49	.1324	.0017	1.855
Concord ¹	.12	.0266	4.36	.8090	.0052	.063
Easthampton ¹	.15	.0407	5.91	1.6822	.0416	.027
Framingham ²	3.46	.0730	9.29	.1928	.0050	1.566
Franklin ¹	1.45	.1048	6.65	.2545	.0228	.667
Gardner (Gardner Area) ⁴	2.62	.1448	10.72	.8808	.0248	.765
Gardner (Templeton Area) ²	2.54	.1529	8.60	1.1487	.0259	.585
Hopedale ²	1.99	.1549	5.98	2.1029	.0533	.050
Hudson	.78	.0797	8.77	1.5463	.0158	.244
Leicester ⁴	.64	.0640	4.72	.3168	.0158	.228
Marion ¹	.84	.0366	8.88	.1002	.0034	.645
Marlborough ²	.74	.0477	6.99	1.4907	.0130	.141
Milford ⁵	1.58	.0803	7.06	1.3279	.0450	.412
Natick	2.69	.0515	8.77	.1726	.0032	.870
North Attleborough ¹	.61	.0217	4.00	.4408	.0050	.078
Northbridge ¹	.48	.0407	3.20	.7178	.0095	.305
Norwood	1.42	.0412	11.66	.4611	.0100	.514
Pittsfield ²	1.29	.1008	4.65	.4060	.0148	.497
Southbridge ²	2.82	.0711	6.63	.0682	.0073	1.319
Spencer ¹	.47	.0282	4.30	.5900	.0024	.576
Stockbridge ⁴	.19	.0486	2.73	.5718	.0526	.079
Westborough ²	1.85	.0750	7.42	.0460	.0041	.828
Worcester ¹	2.11	.0643	11.12	.4858	.0119	1.022

¹ Six samples.² Regular samples from two or more underdrains in one average.³ Five samples.⁴ Four samples.⁵ Eight samples.TABLE NO. 6. — *Efficiency of Sand Filters (Per Cent of Free and Albuminoid Ammonia removed).*

[Parts in 100,000.]

CITY OR TOWN.	FREE AMMONIA.			TOTAL ALBUMINOID AMMONIA.			CHLORINE.		Rate of Operation with Even Distribution (Gallons per Acre per Day) ¹
	Applied Sewage.	Effluent.	Per Cent Removed.	Applied Sewage.	Effluent.	Per Cent Removed.	Applied Sewage.	Effluent.	
Attleboro	3.99	.71	82	.70	.0483	93	6.85	6.25	48,000
Brockton	2.94	2.31	21	.40	.0632	84	6.89	6.58	—
Clinton	2.66	1.37	48	.67	.0824	88	5.08	4.49	57,000
Concord	2.03	.12	94	.37	.0266	93	4.63	4.36	86,000
Easthampton	3.83	.15	96	.50	.0407	92	7.88	5.91	—
Framingham	4.95	3.46	30	1.15	.0730	94	12.03	9.29	41,000
Franklin	2.74	1.45	47	.27	.1048	61	3.92	6.65	69,000
Gardner (Gardner Area)	7.87	2.62	67	1.89	.1448	92	10.10	10.72	79,000
Gardner (Templeton Area)	3.92	2.54	36	.49	.1529	69	7.44	8.60	48,000
Hopedale	4.90	1.99	59	.54	.1549	71	6.48	5.98	44,000
Hudson	3.91	.78	80	.50	.0797	84	8.15	8.77	43,000
Leicester	3.60	.64	82	.55	.0640	88	4.08	4.72	—
Marion	1.63	.84	48	.32	.0366	89	9.04	8.88	141,000
Marlborough	4.02	.74	82	.52	.0477	91	9.66	6.99	48,000
Milford	4.04	1.58	61	.45	.0803	82	7.37	7.06	30,000
Natick	3.12	2.69	14	.46	.0515	89	8.62	8.77	54,000
North Attleborough	1.83	.61	67	.32	.0217	93	4.45	4.00	94,000
Northbridge	2.08	.48	77	.28	.0407	85	2.72	3.20	66,000
Norwood	3.52	1.42	60	.83	.0412	95	15.35	11.66	107,000
Pittsfield	3.03	1.29	57	.45	.1008	78	5.20	4.65	94,000
Southbridge	4.62	2.82	39	.44	.0711	84	8.79	6.63	122,000
Spencer	3.05	.47	85	.59	.0282	95	5.92	4.30	—
Stockbridge	1.49	.19	87	.23	.0486	79	2.20	2.73	—
Westborough	2.27	1.85	19	.54	.0750	86	8.08	7.42	71,000
Worcester	2.78	2.11	24	.68	.0643	91	10.79	11.12	53,000

¹ See also Table No. 7.

TABLE No. 7. — *Extent of Sewerage Works, Rate of Flow, and Rate of Operation of Sand Filters.*

CITY OR TOWN.	Popu- lation, Census of 1920.	Approxi- mate Length of Sanitary Sewers (Miles).	Approxi- mate Number of House Con- nections.	ESTIMATED QUANTITY OF SEWAGE TREATED (GALLONS PER DAY).			Estimated Average Quantity of Sewage per Connection (Gallons per Day).	Net Area of Filter Beds.	Estimated Rate of Operation with Even Dis- tribution (Gallons per Acre per Day).
				Average for Year.	Average for Month of Maximum Flow.	Average for Month of Minimum Flow.			
ATTLEBORO	19,731	34.27	1,361	750,000	1,289,000	530,000	551	15.50	48,000
BROCKTON	66,254	94.85	7,542	3,250,000 ¹	—	—	432	37.00	—
Clinton	12,979	23.49	1,833	1,488,000 ²	2,386,000	2,386,000	812	26.23	57,000
Concord	6,461	8.95	505	367,000	523,000	267,000	727	4.28	86,000
Easthampton	11,261	20.55	1,264	—	—	—	—	2.20	—
FITCHBURG	41,029	—	—	3,597,000	6,490,000 ³	1,360,000 ⁴	—	—	—
Framingham	17,033	32.85	2,673	1,200,000	—	—	449	29.12	41,000
Franklin	6,497	11.62	722	224,000	392,000	93,000	310	3.24	69,000
GARNER	16,971	32.29	2,111	990,000	—	—	469	12.50	79,000
Hopedale	2,777	6.00	351	166,000	292,000	127,000	473	3.79	44,000
Hudson	7,607	12.66	900	390,000	474,000	367,000	433	9.00	43,000
Marion	1,288	3.63	179	106,000 ²	144,000	48,000	592	0.75	141,000
MARLBOROUGH	13,028	34.13	2,435	993,000	1,764,000	537,000	410	29.90	48,000
Millford	13,471	18.08	1,440	280,000 ⁵	573,000	119,000	—	9.30	30,000
Natick	10,907	16.40	1,412	682,000	1,328,000	369,000	483	12.60	34,000
North Attleborough	9,238	17.23	776	657,000	808,000	570,000	847	7.00	94,000
Northbridge	10,174	21.00	840	794,000	996,000	671,000	945	12.00	66,000
Norwood	12,697	21.24	1,507	1,451,000	2,096,000	1,140,000	962	13.54	107,000
PITTSFIELD	41,763	65.91	5,407	3,878,000 ²	4,198,000	3,702,000	717	41.15	94,000
Southbridge	14,245	17.80	1,258	1,033,000	1,162,000	867,000	821	8.50	122,000
Spencer	5,930	—	—	—	735,000	—	—	9.30	—
Westborough	5,789	10.00	553	410,000	—	—	741	5.80	71,000
WORCESTER	179,754	194.13 ⁶	—	3,430,000 ⁷	—	—	—	64.50	53,000

¹ Includes an average of 2,282,000 gallons per day to trickling filter and 978,000 gallons to sand filters.² Entire quantity of sewage not treated.³ Maximum day.⁴ Minimum day.⁵ Records questionable. Amount treated by sand filters only.⁶ Includes 70.01 miles of combined sewers.⁷ Amount treated by sand filters. Total flow 22,110,000 gallons per day.

TABLE No. 8. — *General Features.*

CITY OR TOWN.	Year of Construc- tion, and Additions to Works.	Depth of Under- drains (Feet).	Distance of Under- drains (Feet).	Filtering Material.	Attention given to Disposal Works.
ATLEBORO	1912, 1913	4-7	35	Excellent sand and gravel; found in place	One man all the time; others when necessary.
BROCKTON	1893, 1905, 1908, 1912	5.5	30	Good sand and gravel; found in place	Two men all the time; others when necessary.
Clinton	1898, 1899	8	60-70	Good sand and gravel; found in place	One man once a day.
Concord	1899	none	-	Good sand underlaid with gravel; found in place	One man all the time; others when necessary.
Easthampton	1908	3.5	20-40	Good sand and gravel; largely found in place	Chemist in charge; one foreman, 1 day and 2 night men.
FITCHBURG	1914	-	-	Trickling filter — 10 feet deep	Very little attention; one man once in a while.
Framingham	1890, 1924	-	-	Good sand and gravel	} One man all the time; others when necessary.
Franklin	1915	4.5	26	Good sand and gravel	
GARDNER (Gardner Area)	1891	5.	20	Good sand; handled in construction	One man all the time; others when necessary.
GARDNER (Templeton Area)	1901, 1909	3-4	20-30	Coarse sand; handled in construction	One man all the time; others when necessary.
Hopedale	1900, 1923	3	35-60	Good material — sand and gravel	One man all the time; others when necessary.
Hudson	1904, 1910	5-6	50-100	Good sand and gravel; found in place	Very little attention.
Leicester	1894	4	8	Hard, compact sand; found in place	One man every day in summer; every other day in winter.
Marion	1906	5	-	Mostly good sand; pockets of fine sand and some ledge; largely found in place	One man all the time; others when necessary.
MARLBOROUGH	1891, 1908, 1909, 1910, 1911	4.5-6	30-50	Rather fine sand; found in place	One man every day; others when necessary.
MILFORD	1907, 1924	5	40	Rather fine sand; found in place. Trickling filter	One man all the time; others when necessary.
Natick	1896	6	36	Sand of good quality, but stratified; found in place	One man every day; others when necessary.
North Attleborough	1909, 1910	5-6.5	55	Coarse sand and gravel; found in place	Two men all the time; others when necessary.
Northbridge	1906, 1907, 91 20	4	50-75	Coarse sand and gravel; mostly handled	One man all the time; others when necessary.
Norwood	1909, 1918, 1923, 1924	4-6	40	Good sand and gravel; partly handled	Two men all the time; others when necessary.
Pittsfield	1901, 1915	4	35	Good sand; mostly found in place	Two men all the time; others when necessary.
Southbridge	1908	4	40	Fair sand and gravel; considerable quantity handled; some found in place	One man part of every day.
Spencer	1897, 1923	-1	-	Good sand and gravel; largely found in place	One man all the time; others when necessary.
Stockbridge	1899, 1921, 1922	3-4.5	23	Sand filters, good quality sand	} One man all the time.
Westborough	1892, 1911	3-4.5	30	Irrigation area, rather fine sand	
Worcester	1898 ²	5	30-40	Good sand and gravel; handled in construction	One man all the time; others when necessary.
		4-6	35-50	Good sand and gravel; largely found in place	Several men all the time; large force spring and fall.

² Year of first construction of sand filters. Many additions.¹ Only three beds underdrained.

EXAMINATION OF SEWER OUTLETS DISCHARGING INTO THE SEA.

Examinations have been made of some but not all of the more important sewer outlets discharging into the sea, including especially those of Salem, Peabody, New Bedford, Lynn and Manchester.

In the early part of the year, the Legislature passed an act, Chapter 274, Acts of 1924, authorizing the city of Lynn to construct a system of sewage disposal with an outlet into the sea substantially in accordance with the report of the State Department of Health and the Municipal Council of the city of Lynn in 1916 (Senate Document No. 450) made in accordance with Chapter 63 of the Resolves of the year 1914. These works when completed will relieve the great nuisance now caused by the discharge of the entire sewage of the city upon the flats along the waterfront where conditions have become most objectionable in recent years.

SEWAGE DISPOSAL FOR SALEM, BEVERLY AND PEABODY AND THE TOWN OF DANVERS AND FOR CERTAIN PUBLIC INSTITUTIONS.

On January 16, the Department acting under the provisions of Chapter 64, Resolves of 1923, presented to the Legislature a report and plan relating to a joint system of sewage disposal for the cities of Salem, Beverly and Peabody and the town of Danvers and also for certain state and county institutions in Danvers and Middleton. This report was subsequently referred under the provisions of Chapter 67 of the Resolves of 1924 to a special commission for further consideration and for recommendation as to the apportionment of the cost of the works.

SEWERAGE AND SEWAGE DISPOSAL IN THE VALLEY OF THE MERRIMACK RIVER.

Under the provisions of Chapter 49 of the Resolves of 1923, the Department investigated the question of sewage disposal in the valley of the Merrimack River within the limits of the Commonwealth in the cities of Lowell, Lawrence, Haverhill and Newburyport and in the towns of Dracut, Tyngsborough, Chelmsford, Billerica, Tewksbury, Andover, North Andover, Methuen, Groveland, West Newbury, Merrimac, Amesbury and Salisbury and presented its conclusions and recommendations to the Legislature under date of April 10, 1924. This report was subsequently printed as Senate Document No. 492 of 1924.

SPECIAL INVESTIGATIONS.

Sewerage of the City of Gloucester.

Under the provisions of Chapter 13 of the Resolves of 1924, the Department acting jointly with the Board of Sewerage Survey of the city of Gloucester was directed to make an investigation relative to a sewerage system and sewage disposal for that city and report to the next General Court. The investigations were in progress at the end of the year.

Water Supply of Lawrence and Methuen.

Under the provisions of Chapter 61 of the Resolves of the year 1924, the Department acting jointly with the Water Committee of the city of Lawrence and the Board of Water Commissioners of the town of Methuen has carried on investigations relative to the water supply of Lawrence and Methuen which were in progress at the end of the year.

Improvement of the Concord River in Lowell, Billerica and Chelmsford.

The Department has investigated, in accordance with the requirements of Chapter 269 of the Acts of 1924, the condition of the Concord River and its tributaries in Lowell, Billerica and Chelmsford with a view to preparing a plan for the removal of objectionable conditions in that stream below North Billerica. A report upon this matter will be presented to the Legislature of 1925.

OTHER SPECIAL INVESTIGATIONS.

Considerable work has been done by the Department in co-operation with the Special Commission appointed under the provisions of Chapter 67 of the Resolves of 1924 relative to the sewage of Salem, Peabody, Beverly and Danvers and certain public institutions as required by the resolve.

Much time has also been given in furnishing information for the use of the commission of the Supreme Court appointed to determine the proportion in which

the cost of the Neponset River improvement should be assessed on certain cities and towns named in Chapter 655, Acts of 1911, under which said improvement was carried out.

Considerable time has also been given to co-operating with the special commission appointed under Chapter 491, Acts of 1924 to consider the question of water supply, especially as relating to the Metropolitan water district and the city of Worcester.

WATER SUPPLY OF SOUTHEASTERN MASSACHUSETTS.

Under the provisions of Chapter 400 of the Acts of the year 1924, the Legislature adopted the recommendations of the joint board, consisting of the Department of Public Health and the Metropolitan District Commission, as to taking the Lakeville ponds as sources of water supply for the cities of Taunton, Fall River and New Bedford and certain towns in the neighborhood of these cities.

NUISANCES FROM NOISOME TRADES.

Much work has been done during the year with reference to complaint of objectionable odors due to noisome trades, the most serious complaint having been caused by piggeries, particularly in Wayland and Woburn, where garbage from certain cities is disposed of by feeding to swine. Certain improvements were required at these places and further action postponed awaiting the effect of these improvements.

The works of the East Harbor Fertilizer Company in Truro near the Provincetown boundary which by order of the Department were closed in October, 1923, were subsequently opened after improvements and operated for a short time in 1924. No further action by the Department has been necessary, however, during the past year.

REPORT OF THE DIVISION OF WATER AND SEWAGE LABORATORIES.

H. W. CLARK, *Director.*

During the year 1924 the Division of Water and Sewage Laboratories was engaged in carrying on its usual analytical work and in making the investigations necessary in order that the Department might intelligently answer the many requests from cities, towns, corporations, etc., for information and advice upon questions of water supply, sewerage, sewage disposal and other problems in sanitary science.

In pursuance of this work the number of chemical, bacterial and microscopical analyses given in the following table were made. The results of all the chemical analyses of water supplies, rivers, sewage applied to and effluents from municipal sewage disposal areas, etc., are summarized in the report of the Division of Sanitary Engineering.

Much field work was done during the year in the examination of water supplies, rivers, sewage disposal areas, shellfish areas, etc., and studies were continued on the value of the hydrogen-ion determination both as a governing factor in filtration and in the study of the character of water supplies in general.

Several important investigations were made in regard to the disposal of wastes from chemical works, tanneries and other industries and a beginning made on an investigation of iodine in public water supplies, this latter study being carried on as a part of an investigation of goitre in Massachusetts. The operation of various filters, tanks, etc., for the study of modern methods of sewage disposal, questions of water purification, etc., was continued at the Experiment Station. Comparative studies of English and American analytical methods were made, and investigations of various bacterial methods and the meaning of their results were continued. In all of these various investigations of filtration, bacterial and chemical methods, much analytical work was necessary and this is also summarized in the table.

As usual, a large number of engineers, biologists, chemists, health officials, etc., visited the laboratories and the Experiment Station of this Division during the year, and several classes of students from different technical schools, public health schools, etc., were instructed concerning this class of research laboratory and public health work.

The following table summarizes the analytical work of the Division:—

State House Laboratories.

Samples from public water supplies:

Surface waters	2,330
Ground waters	1,169
Samples from domestic wells, ice supplies, summer camps, etc.	609
Samples from rivers	928
Samples from sewage disposal works:	
Sewages	408
Effluents	538
Samples of wastes and effluents from factories	220
Samples of sea water from various locations	20
Miscellaneous samples (partial analyses)	77
	<hr/>
	6,299

Microscopical examinations	1,999
Special examinations of water (including field work) for manganese, lead, alkalinity and acidity, dissolved oxygen, carbonic acid, etc.	830
Determinations of iodine	22
Examinations of SO ₃ , H ₂ S, CO, etc.	22
	<hr/>
	2,873

Lawrence Experiment Station.

Chemical examinations on account of investigations concerning the disposal of domestic sewage and factory wastes, filtration and other treatment of water supplies, swimming pools, and the investigation of the Merrimack River		2,050
Mechanical and chemical examinations of sands		70
Determinations of dissolved oxygen, carbonic acid, hydrogen-ion concentration, etc. (field work)		175
Bacterial examinations of water supplies, rivers, sewage filter effluents, ice supplies, swimming pools, etc.		2,611
Bacterial examinations in connection with methods of purification of sewage and water		1,801
Bacterial examinations of shellfish		33
		<hr/> 6,740

DETERMINATION OF IODINE IN PUBLIC WATER SUPPLIES.

A beginning has been made in a comprehensive study of the public water supplies of Massachusetts to determine their iodine content, but much trouble has been experienced with the methods of analysis employed, especially in the examination of surface waters. The amount of iodine present in most natural waters is so small in comparison with other mineral salts commonly present in such waters that a large volume of water must be evaporated and the separation of the minute amount of iodine present from the comparatively large amount of other salts and also from the organic matter found in surface waters, presents many difficulties.

At first we used the method of E. F. Eldridge of the Michigan Department of Health. In every analysis we evaporated 50 liters (approximately 11 gallons) of the water under examination. After several examinations of surface water had been made with negative results, various experiments were made by adding known amounts of iodine (5 parts per billion) to such water in order to see if this iodine could be recovered and estimated. In two experiments about 80 per cent of the iodine added was recovered and in two others only about 40 per cent. Eldridge in a recent communication to this Division states that similar difficulties have been experienced by him and he suggests certain changes in the method of analysis that might prevent unsatisfactory results.

The method of McClendon of the University of Minnesota is now being used.

The following table gives the results of all the waters which have been examined up to the end of the year.

SOURCE.	Iodine (Parts per Billion).
Boston, surface water	4.33
Boston, surface water	2.38
Gloucester, surface water	4.40
Taunton, surface water	3.19
Holyoke, surface water	5.86
Lawrence, surface water	0.18
North Andover, surface water	0.15
Ipswich, surface water	3.93
Rockport, surface water	2.58
Provincetown, ground water	0.00
Sharon, ground water	2.54
Methuen, ground water	2.58
Methuen, ground water	2.97
Amesbury, ground water	3.13
Merrimac, ground water	1.70

Hydrogen Ion Tests.

The colorimetric hydrogen ion concentration or pH test has been used by us for three years. This test consists, briefly, in comparing the color produced by the proper indicator in ten cubic centimeters of water with standards of known pH content. Eight different indicators are used to cover the range of pH from

1.2 to 9.8, and one, Brom cresol purple, covers the range 5.4 to 7.0, which includes most of the waters in Massachusetts.

In 1922, pH and other tests were made both in the field and in the laboratory, of samples from twenty-four water supplies. This work was repeated in 1924 with some changes in the water supplies examined. Seven lots of samples were collected during the summer at about ten-day intervals from twenty-five points on twenty public supplies. pH and free carbon dioxide were determined on the samples as collected, and again after twenty-four and ninety-six hours' standing in the laboratory. Alkalinity, soap hardness, and color were determined and bacterial analyses made.

The analyses in general agree very closely with those of 1922. The rainfall from May to August, inclusive (Experiment Station rain gage) was 29.16 inches in 1922 and but 11.91 inches in 1924. The lower rainfall resulted of course in lower colors and better bacterial analyses in the surface supplies in 1924 than in 1922. The general conclusions from the pH tests were the same as given in previous reports, namely, that there is no definite relation between pH and other determinations; free carbon dioxide tends to lower the pH, and alkalinity to raise it; if samples, except those comparatively high in free carbon dioxide, can be examined within twenty-four hours, the pH determinations will not vary more than 0.1 or 0.2 from determinations made in the field.

It will be noticed from the following table that in samples in which the free carbon dioxide has decreased 0.1 part in 100,000 on standing, the pH has increased 0.1. With larger losses of free carbon dioxide the increase of pH is relatively smaller.

Hydrogen Ion Tests in Filtration.

pH tests have been made daily in connection with the operation of mechanical Filter No. 520. So far as our observations go, the pH was of no more value than the alkalinity determination. This may be due to the comparatively small variations in the composition of the Merrimack River water. The free carbon dioxide is low, averaging 0.5 parts in 100,000. The range of alkalinity during the year was from a minimum of 0.5 to a maximum of 1.4; and of the pH from 5.7 to 6.3.

Average Analyses.

SOURCE.	Color.	CARBON DIOXIDE.			HYDROGEN ION CONCENTRATION.			Alkalinity.	Soap Hardness.	Iron.
		Fresh.	After 24 Hrs.	After 96 Hrs.	Fresh.	After 24 Hrs.	After 96 Hrs.			
North Andover supply . . . . .	.17	0.2	0.2	0.1	6.3	6.4	6.4	0.7	1.5	-
Methuen, old supply . . . . .	.40	1.8	1.6	0.5	6.2	6.3	6.6	2.3	3.0	.105
Methuen, new supply . . . . .	.01	3.9	3.5	0.8	5.9	6.0	6.6	3.3	4.1	.020
Lowell supply . . . . .	.07	0.8	0.7	0.3	6.3	6.3	6.6	1.3	1.8	.028
Andover supply . . . . .	.14	0.2	0.2	0.1	6.6	6.6	6.6	0.8	1.4	-
Reading raw water . . . . .	.79	3.7	2.9	1.0	5.4	5.4	6.1	0.7	2.5	.310
Reading artesian water . . . . .	.60	1.4	1.1	0.6	6.7	6.6	6.8	3.4	5.0	.558
Reading tap water . . . . .	.29	0.4	0.3	0.2	7.0	7.0	7.1	5.4	6.6	.091
Wakefield supply . . . . .	.18	0.2	0.2	0.1	6.7	6.7	6.6	1.1	1.2	-
Melrose (Metropolitan supply)	.12	0.2	0.2	0.1	6.5	6.5	6.6	0.7	1.3	-
Lynn supply . . . . .	.22	0.4	0.3	0.1	6.4	6.5	6.7	0.9	2.3	-
Peabody supply . . . . .	.15	0.1	0.1	0.1	6.9	6.9	6.9	1.4	2.4	-
Danvers supply . . . . .	.38	0.3	0.2	0.1	6.4	6.4	6.5	0.5	1.1	-
Ipswich River . . . . .	.65	0.4	0.3	0.2	6.7	6.7	6.8	1.6	2.4	-
Wenham Lake, North end . . . . .	.32	0.2	0.2	0.2	6.7	6.7	6.8	1.1	2.6	-
Wenham Lake, Tap in P. S. . . . .	.30	0.4	0.3	0.2	6.5	6.6	6.7	1.3	2.6	-
Gloucester supply . . . . .	.27	0.7	0.3	0.2	5.7	5.8	5.9	0.0	0.5	-
Rockport supply . . . . .	.35	0.4	0.3	0.2	6.1	6.2	6.3	0.3	1.9	-
Ipswich supply . . . . .	.21	0.2	0.2	0.1	6.8	6.8	6.8	1.2	1.7	-
Artichoke River . . . . .	.34	0.5	0.4	0.2	6.6	6.6	6.8	2.2	2.3	-
Newburyport, effl. of filter . . . . .	.14	0.8	0.7	0.4	6.5	6.5	6.7	2.0	2.3	-
Newburyport supply . . . . .	.15	0.7	0.6	0.3	6.6	6.6	6.8	2.1	2.5	.040
Salisbury supply . . . . .	.11	0.5	0.4	0.2	6.8	6.9	7.0	4.3	4.8	.045
Amesbury supply	-	1.4	1.2	0.6	6.8	6.7	6.9	5.2	7.6	.730
Merrimac supply . . . . .	.01	1.2	1.0	0.4	6.0	6.1	6.4	1.3	3.3	.010

BACTERIAL ANALYSES.

The average bacterial analyses of a number of these supplies from May to August, inclusive, during both years, are presented in a following table. The table is principally interesting as showing results of a comparatively wet (1922).

and a dry (1924) season, and also as showing that these unfiltered surface supplies, with one exception, conformed quite closely to the United States Public Health Service standard of *B. coli* per 100 cc. Two of the surface supplies, North Andover and Wakefield, are treated with chlorine, and one, Reading, is filtered. The good bacterial averages of the ground water supplies are self-explanatory.

Average Bacterial Analyses.

Surface Water Supplies, 1922.

SOURCE.	BACTERIA PER CUBIC CENTIMETER.			B. Coli in 100 cc.
	Four Days (20° C.).	TWENTY-FOUR HOURS (37° C.).		
		Total.	Red.	
Ipswich	73	9	0	4
Newburyport	112	16	1	15
No. Andover, after chlorination	25	3	0	1
Andover	70	9	1	2
Wakefield	23	3	0	1
Lynn	42	4	0	1
Peabody	88	17	2	32
Salem and Beverly	81	13	1	2

Surface Water Supplies, 1924.

Gloucester	51	2	0	5
Rockport	280	11	1	1
Ipswich	135	6	1	1
Newburyport	105	4	0	3
No. Andover, before chlorination	16	4	0	2
No. Andover, after chlorination	4	1	0	0
Andover	51	9	1	1
Wakefield	12	2	0	0
Melrose	69	11	1	1
Lynn	32	9	1	0
Danvers	39	3	0	0
Salem and Beverly	110	2	0	1
Peabody	164	58	3	18

Ground Water Supplies, 1924.

Amesbury	19	2	0	1
Merrimac	36	3	0	0
Salisbury	39	2	0	2
Methuen, old supply	12	3	0	1
Methuen, new supply	17	0	0	0
Lowell	4	1	0	0
Reading	47	1	0	0

STUDIES ON THE FILTRATION OF WATER.

During the year, twenty-five water filters were operated at the Experiment Station. Seventeen of these were filters loaded with either ferric or aluminum hydroxide for studies of color removal, etc., by the Experiment Station method. There were four slow sand filters in operation and one mechanical filter. The work of the municipal filter of the city of Lawrence has been carefully observed as usual during the year and tables showing the bacterial efficiency, etc., of this filter are given beyond.

This is the largest slow sand filter in Massachusetts, treats the extremely polluted Merrimack River water and its effluent is used by approximately 100,000 people. For the past six years the effluent of this filter has been treated with chlorine before being pumped to the distributing reservoir of the city, and an effort has been made by us year after year to have enough chlorine applied to render its effluent bacterially satisfactory. This aim has been accomplished during 1924 and it is worth noting that whereas in 1923 when the applied chlorine averaged 0.45 parts per million, the *B. coli* in the 100 cc. samples collected during the year from the effluents of the "new" filter, the "old" filter, the pump at the Station, the distributing reservoir, a tap at Lawrence City Hall and a tap at the Experiment Station, averaged 16, 17, 13, 16, 10 and 8, respectively. During 1924, with the applied chlorine averaging 0.66 parts per million, the *B. coli* in 100 cc. at these points of collection averaged 5, 7, 3, 2, 2 and 2, respectively; that is, the water coming from the distributing reservoir met in this respect the United States Public Health Service standard.

MECHANICAL FILTRATION OF WATER.

Filter Loading.

Through many years systematic and comparative studies have been made at the Station of slow sand and mechanical filtration of the badly polluted Merrimack River water. These studies are perhaps of especial interest at the present time in comparison with the studies of the United States Public Health Service on filter loading; that is, the bacterial and other load that mechanical filters can receive and the efficiency of such filters under different loads. A summary of this work of the Public Health Service has been given in the Engineering News-Record for December 10, 1924.

During the year Filter No. 520 of the true mechanical type, with coagulation basin, etc., was in operation at an average rate of 67,000,000 gallons per acre daily, — a comparatively low rate for this type of filter. During a portion of the year Merrimack River water was applied to it, and during the second period of operation, river water to which had been added 1 per cent of Lawrence sewage. Eighty-four filter runs were made during the year.

The average amount of aluminum sulphate used when the filter was operated with Merrimack River water was 2.33 grains per gallon and the average amount of soda ash was 0.29 grain per gallon. When sewage was added to the river water the amounts of sulphate of alumina and soda ash were 2.46 and 1.06 grains, respectively. The time allowed for passage through the coagulation basin, was ordinarily three and one-half hours but at times when coagulation was slow and accomplished with difficulty, periods of twenty-four hours were allowed. During the one hundred and eighty-nine days of operation of the filter there were thirty on which satisfactory coagulation could not be obtained no matter how long a period for such coagulation was allowed, and on eleven other days, although coagulation was fairly satisfactory, the bacterial results were high. During periods when coagulation was poor the amount of aluminum sulphate used was at times as high as four grains per gallon and the time of storage twenty-four or more hours. This coagulation difficulty has been experienced in a number of places where waters somewhat similar in character to that of the Merrimack River are so treated and filtered, and apparently can only be overcome by allowing periods of coagulation and sedimentation of several days such as are now given at Springfield, Mass., and will be given at the new filtration plant of Providence, R. I. The average number of *B. coli* in 100 cubic centimeters of the effluent from this filter was 24 when the filter was operated with river water only, and 33 when 1 per cent of sewage was added to the river water. The number of *B. coli* in 100 cubic centimeters of the applied river water was 6,600 and in this water with sewage added, 43,000. The U. S. Public Health Service standard allows 2 *B. coli* per 100 cubic centimeters in filtered drinking waters.

This filter was operated with extreme care under the best of supervision and the results confirm other work of this Division that the Merrimack River water is too polluted to be satisfactorily treated by mechanical filtration alone, although of course with the use of chlorine this filtered water could be made safe bacterially. Similar conclusions were reached by the U. S. Public Health Service from their observation and studies of ten municipal filters treating the badly polluted Ohio River. It is undoubtedly true also that chlorine application is required to lower to a satisfactory degree the bacteria in the effluent of a slow sand filter when treating water of the character of that of the Merrimack River at Lawrence at the present time but the bacterial results of such a filter are more uniform and less dependent on chlorine treatment when filtering this highly polluted river water.

The following table summarizes the bacterial results just described, and this table is followed by a second one, showing results obtained at the Experiment Station during previous years since 1904.

*Average Bacterial Analyses.**First Period.**Merrimack River Water applied to Mechanical Filter No. 520.*

BACTERIA PER CUBIC CENTIMETER.			PER CENT OF BACTERIA REMOVED.			B. Coli in 100 cc.
Four Days (20° C.).	TWENTY-FOUR HOURS (37° C.).		Four Days (20° C.).	TWENTY-FOUR HOURS (37° C.).		
	Total.	Red.		Total.	Red.	
8,800	250	82	—	—	—	6,600
<i>Water after Coagulation and Sedimentation applied to Mechanical Filter No. 520.</i>						
900	24	7	—	—	—	276
<i>Effluent from Mechanical Filter No. 520.</i>						
130	3	1	96.9	98.8	98.8	24

*Second Period.**Merrimack River Water with added Sewage applied to Mechanical Filter No. 520.*

83,700	7,500	890	—	—	—	43,000
<i>Water after Coagulation and Sedimentation applied to Mechanical Filter No. 520.</i>						
5,400	1,000	51	—	—	—	1,753
<i>Effluent from Mechanical Filter No. 520.</i>						
350	12	2	99.6	99.8	99.8	33

Number of B. Coli in 100 Cubic Centimeters of Merrimack River Water applied to, and in Effluents of Mechanical Filters during Previous Years.

YEAR.	Merrimack River Water.	Mechanical Filter Effluents.
1904	3,200	18
1905	6,000	15
1906	15,700	29
1908	—	13
1922	6,900	24
1923	5,600	34

FILTERS CONTAINING ALUMINUM OR FERRIC HYDROXIDE.

Filters of this character were started at the Station in 1917 and descriptions of them and the results obtained by their operation have been given in each report since that date. It has been found that the best method of loading such filters is to thoroughly mix with the sand during filter construction the proper amount of very fine magnesium oxide and then pass a solution of ferric or aluminum sulphate into the filter. For various reasons ferric sulphate is to be preferred. The amount of aluminum or ferric hydroxide precipitated in this way in filters containing four feet in depth of sand at the Station has ranged from 14.4 tons to 43.3 tons per acre. As stated in previous reports, the hydroxides precipitated upon the sand grains have the property of removing coloring and other organic matter from the water applied, until a certain amount has been collected when the absorptive powers of the hydroxides decrease and it becomes necessary to regenerate them by dissolving or removing the stored organic matter by the application of a solution of caustic soda. It is necessary after this treatment to wash the filter slowly for two or three days before normal operation can again be obtained. One of the filters in longest operation at the Station, No. 488, has been at work seven and one-half years and during that period has been treated with caustic soda forty-four times. The total number of days used by such treatments up to the end of the year 1924 was fifty-three.

The commercial ferric sulphate which we have used in loading the filters is known as nitrate of iron and contains about 9 per cent free acid. This free acid is very undesirable as in the dilute solution applied to the filter it tends to cause precipitation as basic sulphate, this having the effect of clogging the filter. Ferric sulphate free from this acid can be made in the laboratory and undoubtedly a commercial product could be made containing a smaller proportion of free acid.

Use of Ferrous Hydroxide.

It was found during the year that ferrous hydroxide is so readily oxidized in contact with air that a filter could be loaded with it and its oxidation result in the precipitation of ferric hydroxide in the filter. The sand of a 4-foot filter had mixed with it the proper amount of magnesium oxide as usual; the copperas or ferrous solution was then applied in twenty-two alternate applications of water, averaging 88,000 gallons per acre each, and the filter allowed to drain thoroughly between each application. In this way enough air was drawn through the sand to cause nearly complete oxidation of the ferrous salt. It was found advisable, however, to neutralize the last 10 per cent of magnesium oxide within the filter with ferric sulphate and the small amount of ferrous hydroxide not oxidized by the air was oxidized in a few hours when the filter was put into operation by the dissolved oxygen in the water applied. The results obtained from this filter, No. 536, are shown in following tables.

There is no marked difference in the efficiency of ferric and aluminum hydroxide in color removal but the latter has the disadvantage of being slightly soluble in the caustic solution used in regeneration hence is slowly removed, this solubility appearing to vary for unknown reasons. Some of our Lawrence filters seem to be little affected; for instance, Filter No. 494 loaded with aluminum hydroxide has been in operation six and one-half years, has been treated with caustic soda forty-two times and is still as efficient in removing color from water as when started. The question of the best strength to use in caustic regeneration has been studied for four years with Filters Nos. 514 and 515. These filters are of the same construction and are operated in the same way. Filter No. 515 has always been treated at times of regeneration with twice the amount of caustic per acre, namely, ten tons, as used in the treatment of No. 514. The small amount used with No. 514 appears, however, to be as efficient, is of course more economical and has less tendency to remove the precipitated hydroxide.

Our studies have shown that in order to be efficient year after year, these loaded filters should contain not less than four feet in depth of sand. Filters two feet in depth give good results for a year or two but their efficiency often becomes much less satisfactory than that of the deeper filters.

Studies of the amount of hydroxide to precipitate have shown that good results have been obtained when 14.4 tons per acre have been precipitated, and it is apparently the amount of effective surface exposed to the water passing through the filter that is the governing factor. Filter No. 525, for instance, which contains four feet in depth of sand of an effective size of .12 millimeter, has been more efficient than filters of the same depth but constructed of coarser sand. This is undoubtedly so because the interstices of the fine sand are smaller, the aluminum hydroxide is hence more finely divided and presents a greater surface area per depth of filter.

It has been found that the time consumed by caustic treatment and regeneration can be materially lessened either by adding dilute sulphuric acid or carbonic acid to the water used in washing and the period of the efficient operation of the filter between treatments lengthened.

During the past eight years the average color of the Merrimack River water applied to these filters has been .39 but during 1924 two filters each $3\frac{1}{2}$ feet in depth loaded with ferric hydroxide, have been operated as follows:— To the first of these, No. 538, water having an average color of 1.14 and having at times a color of 1.80, has been applied and the effluent from this filter applied to No. 539. The effluent from the filter has had an average color of .18 and the average period of efficient operation between caustic treatments has been nineteen days. The average color of the effluent from the secondary filter, No. 539, has been .01. The average rate of operation of each filter was 5,000,000 gallons per acre daily.

A study was made during the year of the average amount of coloring organic matter collected by each filter before treatment with caustic became necessary, and a following table shows the color so collected, expressed as "units." This unit is obtained by multiplying the color reduction in parts per 10,000 by the number of days each filter was operated by the rate in million gallons per acre daily.

The bacterial efficiency of filters of this class is, when filtering a polluted water such as that of the Merrimack River, less satisfactory than achieved by standard-

ized methods of filtration but their effluents are sufficiently well purified in this particular to be rendered absolutely safe by chlorine treatment and their organic purity and attractive appearance is equal to, or better than, the best mechanical filter effluents.

Table showing Average Units of Color absorbed by Various Filters between Treatments with Caustic Soda.

FILTER No.	Units.	Units per Ton of Ferric Hydroxide or Aluminum Hydroxide.
488	66	1.9
494	51	2.5
496	46	3.2
512	71	3.8
514	103	2.7
515	115	3.0
525	188	5.0
528	186	4.9
529	96	3.4
533	171	4.5
534	209	5.3
535	70	1.6
536	97	2.2
538 ¹	91	2.5

¹ Water having an average color of 1.18 applied.

Table showing Data in Regard to Loaded Filters. — Depth, Tons of Hydroxide per Acre, etc.

Filter Number.	Date Started.	Tons of Aluminum or Ferric Sulphate per Acre.	Tons of Aluminum or Ferric Hydroxide per Acre.	Depth of Sand (Feet).	Effective Size of Sand (Millimeters).	Per Cent of Stored Color Removed by Treatment, 1924.
488	May 14, 1917	64.5 ¹	34.5	4.0	.25	48
494	June 7, 1918	80.5	20.2	4.0	.25	62
496	Sept. 19, 1918	27.0 ¹	14.4	4.0	.25	35
512	Feb. 2, 1921	75.0	18.8	4.5	.23	42
514	Feb. 2, 1921	150.0	37.6	4.5	.23	64
515	Feb. 2, 1921	150.0	37.6	4.5	.23	57
518	Apr. 1, 1921	—	—	—	—	—
520	May 26, 1921	—	—	2.5	.40	—
521	July 21, 1921	—	—	4.5	.23	—
525	June 8, 1922	117.0	37.6	3.5	.12	55
528	May 2, 1923	150.0	37.6	4.0	.23	51
529	May 2, 1923	112.5	28.2	3.0	.23	38
530	May 2, 1923	75.0	18.8	2.0	.23	38
531	May 2, 1923	—	—	4.5	.23	—
533	May 18, 1923	150.0	37.6	3.0	.23	38
534	Sept. 6, 1923	73.5 ¹	39.3	4.5	.23	32
535	Nov. 24, 1923	80.4 ¹	43.0	4.0	.25	82
536	Jan. 25, 1924	81.0 ¹	43.3	4.0	.25	26
537	Feb. 6, 1924	—	—	4.0	.23	—

¹ Ferric sulphate.

Average Results of Loaded Filters since Beginning of Operation.

Filter Number.	AVERAGE SINCE START.					Average Color, 1924.
	GRAINS PER GALLON OF WATER FILTERED.		Number of Times Treated.	Average Number of Days between Treatments.	Average Color.	
	Caustic Soda.	Ferric or Aluminum Sulphate.				
Canal	-	-	-	-	.39	.33
488	.47	.08	44	53	.14	.11
494	.49	.12	42	44	.16	.14
496	.17	.04	12	132	.08	.06
512	.27	.18	21	55	.13	.11
514	.18	.35	15	82	.13	.10
515	.44	.36	15	80	.12	.12
518	-	-	-	-	-	.08
525	.23	.45	6	125	-	.09
528	.22	.83	4	126	-	.09
529	.30	.65	7	70	-	.13
530 ¹	.18	.82	11	70	-	.13
531	-	-	-	-	-	.30
533	.17	.86	4	122	-	.10
534	.24	.46	3	137	-	.09
535	.50	.79	5	56	-	.08
536	.29	.93	3	81	-	.09

¹ On April 14, 1924, the sand was removed from Filter No. 532 and added to No. 530. Results include operation of No. 532.

Average Chemical Analyses.

Canal Water applied to and Effluents from Filters Nos. 488, 494, 496, 512, 514, 515, 518, 520, 521, 525, 528, 529, 530, 531, 533, 534, 535, 536, and 537.

[Parts in 100,000.]

Filter Number.	APPEARANCE.		AMMONIA.			NITROGEN AS —		Oxygen consumed.	Iron.	Alkalinity.	Carbon Dioxide.	Hydrogen Ion Concentration.
	Turbidity.	Color.	Free.	ALBUMINOID.		Nitrates.	Nitrites.					
				Total.	In Sol.							
Canal	0.1	.33	.0095	.0151	.0099	.019	.0008	.48	.0534	0.8	0.5	6.1
488	0.0	.11	.0060	.0047	—	.024	.0006	.17	.0221	1.1	0.4	6.3
494	0.0	.14	.0070	.0059	—	.026	.0011	.23	.0306	1.1	0.4	6.4
496	0.0	.06	.0032	.0045	—	.027	.0003	.14	.0224	1.3	0.4	6.5
512	0.0	.11	.0048	.0050	—	.027	.0003	.17	.0219	1.2	0.3	6.4
514	0.0	.10	.0047	.0052	—	.026	.0001	.18	.0213	1.2	0.5	6.4
515	0.0	.12	.0057	.0052	—	.037	.0006	.18	.0252	1.2	0.4	6.4
518	0.0	.08	.0010	.0035	—	.036	.0001	.16	.0193	1.2	0.4	6.4
520	0.0	.03	.0114	.0053	—	.025	.0007	.19	.0150	0.5	0.5	5.9
521	0.0	.20	.0030	.0061	—	.038	.0010	.32	.0401	1.2	0.6	6.3
A521	0.1	.34	.0257	.0187	.0124	.019	.0008	.50	.0534	0.8	0.6	6.0
525	0.0	.09	.0037	.0026	—	.026	.0007	.13	.0207	1.2	0.5	6.3
528	0.0	.09	.0040	.0064	—	.028	.0005	.19	.0196	1.1	0.5	6.3
529	0.0	.13	.0060	.0071	—	.030	.0014	.23	.0220	1.4	0.4	6.4
530	0.0	.13	.0028	.0054	—	.025	.0003	.20	.0308	1.1	0.5	6.3
531	0.0	.30	.0034	.0065	—	.027	.0015	.35	.0304	1.1	0.5	6.3
533	0.0	.10	.0036	.0060	—	.030	.0007	.21	.0228	1.1	0.5	6.3
534	0.0	.09	.0040	.0033	—	.032	.0014	.12	.0400	1.2	0.3	6.3
535	0.0	.08	.0046	.0046	—	.022	.0006	.14	.0211	1.2	0.3	6.4
536	0.0	.09	.0037	.0050	—	.033	.0007	.17	.0293	1.3	0.4	6.4
537	0.0	.25	.0024	.0062	—	.028	.0021	.30	.0431	2.2	0.2	6.8

Average Chemical Analyses.

Colored Brook Water applied to Filter No. 538 and Effluents from Filters Nos. 538 and 539.

[Parts in 100,000.]

Filter Number.	APPEARANCE.		AMMONIA.			NITROGEN AS —		Oxygen consumed	Iron.	Alkalinity.	Carbon Dioxide.	Hydrogen Ion Concentration.
	Turbidity.	Color.	Free.	ALBUMINOID.		Nitrates.	Nitrites.					
				Total.	In Sol.							
A538	0.1	1.14	.0062	.0299	.0216	.014	.0008	1.06	.1840	1.1	1.7	5.9
538	0.0	.18	.0064	.0115	-	.010	.0000	.18	.0787	1.9	1.1	6.6
539	0.0	.01	.0064	.0080	-	.003	.0000	.12	.0100	1.8	1.2	6.4

Bacterial Results of Typical Loaded Filters.

Merrimack River Water applied to Filters Nos. 488, 494, 496, 525, and 529.

BACTERIA PER CUBIC CENTIMETER.			PER CENT OF BACTERIA REMOVED.			PER CENT OF SAMPLES CONTAINING B. COLI.					B. Coli in 100 cc.
Four Days (20° C.).	24 HOURS (37° C.).		Four Days (20° C.).	24 HOURS (37° C.).		.001 cc.	.01 cc.	0.1 cc.	1 cc.	10 cc.	
	Total.	Red.		Total.	Red.						
4,200	250	82	—	—	—	0	42	100	100	100	4,600
Effluent from Filter No. 488.											
200	9	2	95.2	96.4	97.6	—	—	0	40	98	43
Effluent from Filter No. 494.											
380	15	2	90.9	94.0	97.6	—	—	0	44	98	47
Effluent from Filter No. 496.											
104	2	0	97.5	99.2	100.0	—	—	0	4	50	7
Effluent from Filter No. 525.											
390	13	2	90.7	94.8	97.6	—	—	0	49	95	54
Effluent from Filter No. 529.											
650	13	3	84.9	94.8	96.3	—	—	0	65	100	65

LAWRENCE CITY FILTERS.

The city of Lawrence is supplied with water from the Merrimack River which is purified by slow sand filtration followed by chlorine treatment. Two filters are in use; the older, 2.2 acres in area, is divided into three sections, two open and one covered. The newer filter, .75 of an acre in area, is covered. During the year additional underdrains were placed in the west section of the older filter, resulting in an increased yield. The effluents from the two filters flow to a common pump well where chlorine is applied, the average amount during 1924 being 0.66 part per million. This is an increase of 0.21 part per million over last year and the beneficial result is shown in the improved bacterial results. The average volume of water filtered daily during the year was 4,723,000 gallons.

*Average Bacterial Analyses.**Merrimack River. — Intake of the Lawrence City Filters.*

BACTERIA PER CUBIC CENTIMETER.			PER CENT OF BACTERIA REMOVED.			PER CENT OF SAMPLES CONTAINING B. COLI.					B. Coli in 100 cc.
Four Days (20° C.).	TWENTY-FOUR HOURS (37° C.).		Four Days (20° C.).	TWENTY-FOUR HOURS (37° C.).		.001 cc.	.01 cc.	0.1 cc.	1.0 cc.	10 cc.	
	Total.	Red.		Total.	Red.						
8,800	290	87	—	—	—	2	46	100	100	100	6,600
<i>Effluent from the Lawrence City Filter (Old Filter).</i>											
19	2	0	99.8	99.3	100	—	—	0	3	26	5
<i>Effluent from the Lawrence City Filter (New Filter).</i>											
20	2	0	99.8	99.3	100	—	—	0	4	32	7
<i>Mixed Effluents as pumped to the Distributing Reservoir.</i>											
22	3	0	99.8	98.9	100	—	—	0	1	21	3
<i>Water from the Outlet of the Distributing Reservoir.</i>											
33	5	0	99.1	98.2	100	—	—	0	0	23	2
<i>Water from a Tap at Lawrence City Hall.</i>											
34	4	0	99.1	98.6	100	—	—	0	0	17	2
<i>Water from a Tap at the Lawrence Experiment Station.</i>											
37	4	0	99.0	98.6	100	—	—	0	0	11	2

*Average Chemical Analyses.**Merrimack River. — Intake of the Lawrence City Filters.*

[Parts in 100,000.]

Temperature (Degrees F.).	APPEARANCE.		AMMONIA.			Chlorine.	NITROGEN AS —		Oxygen consumed.	Iron.	Soap Hardness.
	Turbidity.	Color.	Free.	ALBUMINOID.			Nitrates.	Nitrites.			
				Total.	In Sol.						
51	0.1	.32	.0210	.0176	.0122	.48	.015	.0008	.49	.0602	1.4
Effluent from Lawrence City Filter (Old Filter).											
52	0.0	.29	.0098	.0074	—	.62	.033	.0004	.34	.0980	1.5
Effluent from Lawrence City Filter (New Filter).											
52	0.0	.22	.0046	.0068	—	.47	.026	.0002	.34	.0430	1.4
Water from the Outlet of the Distributing Reservoir.											
52	0.0	.31	.0063	.0082	—	.54	.031	.0002	.33	.0850	1.4
Water from a Tap at Lawrence City Hall.											
53	0.0	.32	.0037	.0073	—	.53	.036	.0002	.31	.0860	1.4
Water from a Tap at the Lawrence Experiment Station.											
53	0.0	.32	.0023	.0069	—	.53	.034	.0000	.30	.0900	1.4

CHARACTER OF THE SEWAGE USED AT THE LAWRENCE EXPERIMENT STATION.

Formerly each report contained average analyses of the sewage used at the Station in order that engineers and others interested in this work could be informed in regard to the strength of this sewage compared with that of other towns, municipalities, etc., requiring sewage purification areas. It is still necessary to present these average analyses for the year. The sewage used is pumped to the Station through a pipe about 1,850 feet long from a Lawrence sewer and is taken at a point above the entrance of any mill wastes.

The following tables give the average analyses for the year. Regular sewage is the average of the sewage as pumped; settled sewage presents the average analyses after the sewage coming to the Station has received a certain amount of sedimentation in settling tanks and represents the sewage applied to all filters, tanks, etc., at the Station with the exception of Filters Nos. 1, 4 and 9A.

*Average Analyses.**Regular Sewage.*

[Parts in 100,000.]

AMMONIA.			KJELDAHL NITROGEN.		Chlorine.	Oxygen consumed.	Bacteria per Cubic Centimeter.
Free.	ALBUMINOID.		Total.	In Solution.			
	Total.	In Solution.					
3.25	.73	.45	1.25	.78	10.1	4.84	5,100,000
Settled Sewage.							
3.25	.53	.33	.93	.59	7.9	3.35	5,270,000
Sewage applied to Filters Nos. 1, 4 and 9A.							
3.08	.58	-	1.05	-	9.5	4.18	5,100,000

*Average Solids.**Regular Sewage.*

[Parts in 100,000.]

UNFILTERED.			FILTERED.			IN SUSPENSION.		
Total.	Loss on Ignition.	Fixed.	Total.	Loss on Ignition.	Fixed.	Total.	Loss on Ignition.	Fixed.
65.3	32.7	32.6	49.6	21.8	27.8	15.7	10.9	4.8
<i>Settled Sewage.</i>								
47.9	21.2	26.7	37.6	14.5	23.1	10.3	6.7	3.6

HOUSEHOLD SEPTIC TANKS.

The two household septic tanks put in operation in June, 1920, were continued throughout 1924. It is only by years of operation of such tanks that the treatment of sewage accomplished by them is clearly learned. These tanks are of concrete construction. One of them is 4 feet long, 2 feet wide and 40 inches deep, with a sloping bottom and a capacity of 185 gallons. The second tank is constructed like the first but consists of two compartments and has a capacity of 370 gallons. The sewage enters each tank through trapped inlets and discharges through a pipe reaching fifteen inches below the surface of the sewage in the tank. A baffle is placed one-third of the distance from the inlet to the outlet and reaches to within eight inches of the surface of the sewage and within ten inches of the bottom of the tank. A trapped outlet is provided for the escape of gas, and air is carefully excluded. The first tank receives fresh household sewage and the second, Lawrence city sewage as pumped to the Station; both are so operated that theoretically the sewage is held within each for two days. They were opened in April, 1924, for sludge measurements and each was found to be about one-third full of black inoffensive sludge. Calculations of the amounts of suspended solids in the sewage entering the tanks during the period of operation up to April remaining in the tanks or appearing in their effluents showed that since the tanks were started 78 per cent of the suspended solids deposited in Tank No. 507 had been destroyed and in Tank No. 508, 83 per cent. The proportion destroyed appears to be increasing the longer the tanks are operated. The sludge in Tank

No. 507 contained 9.1 per cent fats, 3.55 per cent nitrogen and lost 44 per cent on ignition. The sludge in Tank No. 508 contained 13.6 per cent fats, 2.26 per cent nitrogen and lost 43.7 per cent on ignition.

Average Analyses.

Fresh Sewage applied to Closed Septic Tank No. 507.

[Parts in 100,000.]

AMMONIA.			KJELDAHL NITROGEN.		Chlorine.	Oxygen consumed.	Bacteria per Cubic Centimeter.
Free.	ALBUMINOID.		Total.	In Solution.			
	Total.	In Solution.					
5.41	.93	.55	1.62	.99	8.6	5.19	3,500,000
Effluent from Closed Septic Tank No. 507.							
4.98	.42	.28	.75	.51	7.6	2.84	1,680,000
Regular Sewage applied to Closed Septic Tank No. 508.							
3.29	.60	.36	1.06	.63	8.4	4.10	2,630,000
Effluent from Closed Septic Tank No. 508.							
2.77	.22	.16	.40	.28	6.5	1.79	1,400,000

PURIFICATION OF SEWAGE BY AERATION.

The activated sludge process as developed at the Station in 1912 and succeeding years is growing in favor as the most economical method of sewage purification yet discovered. Many large municipal plants are in operation at the present time both in this country and in England. At the Station Tank No. 485 with a capacity of 690 gallons and put in operation in April, 1917, was continued during 1924. The applied sewage is six and one-half hours in passing through the tank and the effluent of the tank has been stable at all times. Surplus sludge equivalent to 884 pounds dry matters per million gallons of sewage was withdrawn during the year. The nitrogen and fat content of this sludge was 6.26 and 5.5 per cent, respectively, compared with 2.88 per cent and 28 per cent, respectively, in sludge collected from Lawrence sewage by sedimentation.

Average Analyses.

Sewage applied to Activated Sludge Tank No. 485.

[Parts in 100,000.]

APPEARANCE.		AMMONIA.			KJELDAHL NITROGEN.		Chlorine.	NITROGEN AS —		Oxygen consumed.	Bacteria per Cubic Centimeter.
Turbidity.	Color.	Free.	ALBUMINOID.		Total.	In Sol.		Nitrates.	Nitrites.		
			Total.	In Sol.							
—	—	3.30	.55	.34	.99	.61	7.3	—	—	3.87	5,270,000
<i>Effluent from Activated Sludge Tank No. 485.</i>											
0.5	.58	2.31	.17	.14	.32	.26	7.8	.07	.0378	1.08	390,000

Average Solids.

Sewage applied to Activated Sludge Tank No. 485.

[Parts in 100,000.]

UNFILTERED.			FILTERED.			IN SUSPENSION.		
Total.	Loss on Ignition.	Fixed.	Total.	Loss on Ignition.	Fixed.	Total.	Loss on Ignition.	Fixed.
54.0	24.3	29.7	40.0	16.5	23.5	14.0	7.8	6.2
<i>Effluent from Activated Sludge Tank No. 485.</i>								
39.4	14.2	25.2	36.0	11.7	24.3	3.4	2.5	0.9

OPERATION OF TRICKLING FILTERS.

Second to the activated sludge process in its economy of construction and operation per million gallons of sewage purified is the trickling filter method, and nine trickling filters were operated at the Station during 1924.

The oldest of these filters, No. 135, is in its twenty-fifth year of operation. Filters Nos. 452 to 455, inclusive, are constructed of 4, 6, 8 and 10 feet in depth, respectively, of broken stone that will pass a one and one-half inch screen and be retained on a one-half inch screen. Filters Nos. 473 to 475, inclusive, constructed of 6, 8 and 10 feet in depth, are constructed of coarser broken stone passing a two and one-half inch or a three-inch screen and retained on a one and one-half inch screen.

The effluent of Filter No. 453 after sedimentation varying from six to twenty-four hours was applied to Filter No. 522. This filter contains 9 feet in depth of one to two-inch crushed stone. During settling 40 per cent of the suspended solids was removed from the effluent of Filter No. 453 and the nitrates were reduced .75 parts in 100,000. The available oxygen from the reduced nitrates was equivalent to 2.15 parts dissolved oxygen and was probably used in oxidizing organic matter of the effluent. The effluent of Filter No. 453 was stable 75 per cent of the time and that of Filter No. 522 all of the time. All the other trickling filters except Nos. 452 and 474 gave stable effluents throughout the year. The effluent of Filter No. 452 was stable 88 per cent of the time and that of Filter No. 474, 75 per cent of the time.

The average rates of operation of these filters and the average analyses of their effluents are given in a following table.

Average Analyses.

Effluents from Trickling Filters Nos. 135, 452, 453, 454, 455, 473, 474, 475, 522 and Applied No. 522.

[Parts in 100,000.]

Filter Number.	Quantity Applied. Gallons per Acre Daily.	AMMONIA.			Kjeldahl Nitrogen.	Chlorine.	NITROGEN AS —		Oxygen consumed.	Bacteria per Cubic Centimeter.
		Free.	ALBUMINOID.				Nitrates.	Nitrites.		
			Total.	In Sol.						
135	1,423,000	1.33	.36	.19	.60	7.2	1.66	.0149	2.45	580,000
452	758,000	2.11	.43	.27	.76	7.3	1.08	.0228	2.65	650,000
453	2,220,000	1.79	.36	.23	.67	7.3	1.17	.0601	2.49	630,000
454	1,717,000	1.71	.34	.21	.61	7.1	1.20	.0219	2.37	880,000
455	2,370,000	1.57	.31	.19	.56	7.2	1.39	.0251	2.19	780,000
473	1,140,000	2.15	.48	.25	.70	7.2	.75	.0328	2.48	1,050,000
474	1,720,000	1.98	.34	.20	.64	7.2	.51	.0936	2.23	1,680,000
475	2,390,000	1.72	.45	.26	.81	7.3	1.29	.0273	2.59	1,500,000
522	6,280,000	1.75	.18	.13	.33	6.8	.74	.1057	1.41	950,000
A 522	—	2.16	.25	.17	.42	6.5	.42	.0498	1.67	1,190,000

OPERATION OF CONTACT FILTERS.

One contact filter, No. 175, is kept in operation as a study of the permanency of this type of filter and as an example of this method of sewage purification. It was started in 1901, and contains 39 inches in depth of coke passing a one-inch screen and retained on a one-quarter inch screen.

During 1924 the filter was operated once daily with settled sewage, stood full two hours before draining and was rested every sixth week. The effluent was clear, well nitrified and always stable. Because of clogging, which is inherent in contact filters, the material of this filter has been removed and washed twice, — once in 1911 and again in 1920. The open space decreased 4 per cent during 1924 and the total decrease since the filter material was washed in 1920 has been 27 per cent.

*Average Analyses.**Effluent from Contact Filter No. 175.*

[Parts in 100,000.]

Quantity Applied. Gallons per Acre Daily.	AMMONIA.			Kjeldahl Nitrogen.	Chlorine.	NITROGEN AS —		Oxygen Consumed.	Bacteria per Cubic Centimeter.
	Free.	ALBUMINOID.				Nitrates.	Nitrites.		
		Total.	In Sol.						
276,000	.35	.13	.09	.27	7.0	1.92	.0363	1.05	680,000

*Average Solids.**Effluent from Contact Filter No. 175.*

[Parts in 100,000.]

UNFILTERED.			FILTERED.			IN SUSPENSION.		
Total.	Loss on Ignition.	Fixed.	Total.	Loss on Ignition.	Fixed.	Total.	Loss on Ignition.	Fixed.
43.9	19.5	24.4	41.4	18.4	23.0	2.5	1.1	1.4

INTERMITTENT SAND FILTERS OPERATED WITH UNTREATED SEWAGE.

Filters Nos. 1, 4 and 9A.

Each of these three sand filters is 1/200 of an acre and at the end of the year Filters Nos. 1 and 4 had been operated continuously for nearly thirty-seven years and Filter No. 9A had been operated thirty-four years. Regular sewage without preliminary clarification has always been applied to these filters and for many years it has been the practice to apply only as much sewage to each filter as can be purified without materially increasing the amount of organic matter stored within the filter. These and other sewage filters at the Station are not operated on Sundays or holidays.

For many years the surface of Filters Nos. 1 and 9A have been trenched and ridged late in the Fall and leveled in the Spring. Board coverings are put over the trenches on all three filters and this aids materially in keeping the surface of the trenches from freezing. They were put on December 14, 1923, and removed April 9, 1924. The surface of Filter No. 4 is arranged in circular trenches, fourteen inches wide, which are filled to a depth of twelve inches with sand of an effective size of .48 millimeter. Sewage is applied to these trenches, grass being permitted to grow on the ridges.

The surface of the filters was dug over to a depth of from ten to twelve inches twice and raked fourteen times during the year. It is now thirty-one years since surface sand has been removed from these filters.

*Average Analyses.**Effluent from Filter No. 1.*

[Parts in 100,000.]

TEMPERATURE (DEGREES F.).		AMMONIA.		Chlorine.	NITROGEN AS —		Oxygen Consumed.	Alkalinity.	Bacteria per Cubic Centimeter.
Applied.	Effluent.	Free.	Albuminoid.		Nitrates.	Nitrites.			
57	51	.1800	.0351	6.5	2.17	.0007	.34	—1.9	18,500
<i>Effluent from Filter No. 4.</i>									
57	50	.0028	.0106	6.1	1.74	.0004	.23	—0.6	270
<i>Effluent from Filter No. 9A.</i>									
57	51	.0666	.0272	7.3	1.73	.0021	.37	0.5	7,500

REPORT OF DIVISION OF FOOD AND DRUGS.

HERMANN C. LYTHGOE, *Director.*

The Food and Drug Division of the Massachusetts Department of Public Health has been engaged during the year 1924 in the usual routine work of the enforcement of the milk, food, drug, cold storage, slaughtering, bakery, soft drink, mattress, and coal laws; in the examination of samples submitted by police authorities; in the examination of samples submitted by the Purchasing Agent; and also in the manufacture of arsphenamine.

The total samples examined exceeded those examined in 1923, which samples, exclusive of those examined for the Purchasing Agent, consisted of 5,796 samples of milk, 1,946 samples of foods other than milk, 443 samples of drugs, 5 samples of mattress filling, 101 samples of narcotics, etc., 6,799 samples of liquor, and 65 samples of coal.

There were 323 prosecutions, or 55 more than during the past year. Of these prosecutions, 299 resulted in conviction. Seventeen defendants were found not guilty; four cases were dismissed for want of prosecution; one case was filed without plea; and two cases were quashed.

The following table gives a summary of the court cases.

Summary of Prosecutions.

NATURE OF OFFENCE.	Convicted.	Discharged.	Dismissed.	On File without Plea.	Quashed.
Milk:					
Low standard	116	3	-	-	-
Cream removed	9	-	-	-	-
Added water	31	1	1	-	-
Butter, added water or low fat	6	-	-	-	-
Clams, added water	-	1	2	-	-
Vanilla, adulterated or misbranded	2	-	-	-	-
Maple Sugar, adulterated	2	-	-	-	-
Olive Oil, etc., adulterated or misbranded	6	-	1	-	-
Sausages:					
Containing preservative	3	-	-	-	-
Containing excess starch	3	-	-	-	-
Containing coloring matter	7	1	-	-	-
Soft Drinks containing saccharine	11	1	-	1	-
Low standard vinegar	2	-	-	-	-
Eggs:					
Decomposed	1	-	-	-	-
False advertising	5	-	-	-	-
Misbranded	1	-	-	-	-
Cold storage, unmarked	69	1	-	-	-
Absence of sign "Cold Storage Eggs"	1	-	-	-	-
Decomposed Food	1	-	-	-	-
Diseased Meat	-	1	-	-	-
Drugs	7	1	-	-	-
Other Cold Storage Violations	3	-	-	-	-
Violations of Slaughtering Law	6	4	-	-	2
Violations of Mattress Law	5	2	-	-	-
Violations of Sanitary Food Law	-	1	-	-	-
Violations of Coal Law	2	-	-	-	-
	299	17	4	1	2

The details of these court cases will be found in table 1. It will be noted that there was an increased number of cases for the sale of low standard milk. These cases nearly all resulted from the sale of partially skimmed milk by the glass in restaurants. Inasmuch as considerable of these violations may have been the result of accident, the cases were brought under the low standard law rather than under the law relating to the sale of adulterated milk. In each of these cases it was established that the milk which the restaurant keeper was purchasing was actually milk conforming to the legal requirements.

Of the 5,796 milk samples examined, 1,692 were found to be below the legal standard; 183 contained added water; and 256 had a portion of the cream removed.

The usual milk statistics will be found in tables 2 and 3.

There were 101 samples of butter examined, of which 9 were found to contain excess moisture or to be deficient in fat.

In the latter part of 1923, it was discovered that due to a technical error in the wording of a certain statute, no penalty was applicable to persons selling goods in violation of the regulations of this Department. This was remedied by legislation during the past year, but a few prosecutions were made for selling butter containing sufficient moisture to reduce and lower the quality and purity of the butter. All these cases resulted in convictions.

The single sample of candy reported adulterated was a specimen of wormy sweet chocolate submitted by a citizen on complaint. The premises of the person said to have made the sale were investigated the next day by an inspector of the Department, and no wormy chocolate was found by the inspector.

There were 32 samples of canned goods examined, 6 of which were reported as adulterated. These samples were decomposed samples and confiscations were made in all cases.

Water is the favorite food adulterant. It is cheap and it can be mixed with various articles of food with considerable profit. Its use in milk is common knowledge. Its use as an adulterant of butter is less frequent. Its use as an adulterant of shellfish is quite frequent. Shellfish are salt water fish, and when removed from the shells and placed in water, the tissues of the fish will absorb water and become enlarged. These absorptions of water will sometimes be as great as 80% of the original weight of the shellfish after being removed from the shell. Forty-two samples of scallops were obtained, 4 of which were found to be in this condition. There were 59 samples of clams obtained, 25 of which were found to be in this condition. After considerable investigation, samples of clams were obtained from the persons who probably were responsible for actually adding the water. Because of the fact that evidence was presented by the defence to show that this was a common practice on the part of the trade, the cases were either dismissed or discharged. In past years we have been more successful in cases involving the watering of scallops, and for practical purposes have kept the market free from soaked scallops. The four samples of watered scallops were obtained from retail stores, the actual watering being caused by placing the scallops directly in contact with ice by the retailer.

In the usual routine work of the examination of eggs, 377 samples were collected, of which 168 were sold in violation of the existing statutes. These eggs were either storage eggs, sold without the label required by statute; storage eggs successfully sold as fresh eggs; old eggs which had not been in storage and were sold as fresh eggs; or were eggs which were falsely advertised as fresh eggs. A few instances were found where the eggs were decomposed, and one successful prosecution was instituted for the sale of such eggs. In investigating one of these cases it developed that the jobber purchased the eggs in Kansas; brought the eggs to Boston; turned off the cold storage from his holding room; kept the eggs for two months; and sold them to a wholesaler who had full knowledge of what the eggs were. The wholesale dealer put the eggs in cartons and labeled them "Extra Fresh Eggs." Without doubt if the evidence could be collected, as in this case, considerable of the so called "fresh eggs" would be found to be eggs of this character, which in fact are not such good eggs as are the better grade of cold storage eggs.

There were 45 samples of flavoring extracts examined, 11 of which were found to be adulterated or misbranded. These cases were investigated and resulted in two prosecutions and convictions. There were 15 samples of fruit syrup examined, 7 of which were found to be misbranded. These were all manufactured by one person, who was warned and who mended his ways. There were 8 samples of maple sugar collected, 7 of which were found to be adulterated. After investigating, two cases were prosecuted and convicted. A third case was obtained for prosecution, but the person to be prosecuted left the state and a summons could not be served upon him. This case is still pending and undoubtedly will be tried during the next fiscal year.

In the examination of meat products, 516 samples of sausages were obtained, of which 55 were adulterated either with excessive cereal or with color. One sample of decomposed kidneys was obtained, resulting in a prosecution and conviction.

Of the cases prosecuted, three were for the excessive use of starch or cereal, and 8 were for the use of color. Considerable difficulty is encountered in obtaining

evidence against the manufacturers of these sausages. The bulk of the samples are purchased in retail stores because experience has shown that whenever the inspectors visit the factories the sausages on hand are in compliance with the law. These manufacturers make several grades of sausages, and it is a comparatively easy matter to get the inferior grades out of the way before the inspector reaches the rooms where they are kept. It frequently happens that a retail store keeper will state that he purchased the sausages from a certain person and when the hearings are held, or when the court cases are tried, the retailer will frequently state that he purchased sausages from several dealers and is unable to identify those sausages as being the ones sold him by the manufacturer in question.

The adulteration of sausages is a seasonal practice, occurring between the middle of December and the middle of February. During the balance of the year there is very little adulterated sausage on the market. This seasonal variation may be psychological. After several months have gone by without any prosecutions, the sausage manufacturers probably infer that the Department is not examining sausages, and therefore they decide to take chances in order to increase their profits. Without doubt, the added profits accruing from the addition of water to sausages more than offsets the cost of fines and other costs connected with a prosecution.

There were 12 samples of adulterated or misbranded olive oil of 52 samples examined. The sale of adulterated olive oil follows very closely increase in the price of olive oil. When olive oil is cheap there is but little adulterated or misbranded olive oil upon the market. The sale of adulterated oil is mostly confined to the Italian and Greek dealers, and obtaining evidence against the wholesaler is unusually difficult because of alleged unfamiliarity with the English language on the part of both the wholesaler and the retailer. The retailer who buys these compound oils probably knows what he is buying, although he will state that he thought he was buying pure olive oil. Many of these persons show no desire to co-operate with the Department in curtailing these abuses.

There were a number of samples of compound oil found in cans labeled "Salad Oil" or "Virgin Oil." The cans contained pictures of foreign landscapes, very prominent in which were olive trees or an olive grove or a picture of a fine looking young woman carrying a basket of olives. The dealers in this oil placed the blame upon the manufacturers of the can, stating that they requested the contractor to furnish a can in which compound oil could be sold in conformance with the law. The counsel for these men requested that the manufacturers of the can be brought before the court on a conspiracy charge. One of the can manufacturers was advised to change the picture and to have instead of the olive tree a picture of a cotton field in the southern states, and to use the words, "Savannah, Georgia" in place of "Lucca Oil." This the manufacturer objected to on the ground that such a can would not be purchased by the oil dealers. Presumably he was correct.

During the years 1922 and 1923, the examinations of soft drinks indicated that the manufacturers were not using saccharine. There were of course no prosecutions and probably the trade assumed that the Department was not obtaining samples of soft drinks for examination. During the Spring of 1924 it was discovered that one manufacturer was apparently using saccharine. His product was investigated and he was found to be manufacturing ginger ale in which he used saccharine. At the hearing, this gentleman stated that he had been in the business for thirty years; that he was unaware of any law or regulation regarding the use of saccharine; that he was a member of the Bottlers' Association; that he knew nothing of the saccharine controversy between the Department of Public Health and the Association a few years ago; that he never received any communication from the Association regarding saccharine; that he stopped using saccharine after the inspector visited his establishment although nothing was said about saccharine at this visit, but he suspected in some manner that saccharine might have been the cause of the visit. Inasmuch as the Association had upon several occasions circularized its members regarding the regulation of the Department, it is to be presumed that this gentleman received those circulars. He was prosecuted and fined.

A very thorough survey was made of most of the soft drink establishments

in the state, and wherever saccharine was found hearings were held and prosecutions were made when possible. The District Court at Worcester and the Police Court at Chicopee declined to receive complaints for violation of this regulation. The other courts received complaints and convictions were obtained in all cases but two. One case resulted in a finding of not guilty on second offence because of doubtful evidence as to the time of sale, it appearing that possibly the material in question might have been part of the same lot upon which the person had already been convicted. The other case was placed on file without finding. Five persons paid fines of \$15.00 and three paid fines of \$25.00. Three cases were placed on file. The samples obtained were all examined for the total sugar content, and it was found that all the samples containing less than 6.9% of sugar also contained saccharine. Saccharine was also found in some beverages containing as high as 9.4% of sugar, but no saccharine was found in any beverage containing more than that amount.

The sugar content as determined upon 384 samples not containing saccharine varied between 6.9% and 16.6%. 50% of these samples contained less than 11.89% sugar and more than 9.84% sugar. A sugar standard would practically abolish the use of saccharine in these beverages, provided the standard were set sufficiently high. This standard should be at least 10%.

The profit from the use of saccharine is considerable. Each pound of saccharine used will take the place of 550 pounds of sugar and will give the manufacturer a profit of about \$30.00. The profit comes from the use of additional quantities of water, the real adulterant not being the saccharine, but a dilute solution of saccharine in water.

These establishments were also examined as to their sanitary condition. It was found that many of them were being operated without the permit required by statute, and many permits had been granted to persons operating unsanitary establishments.

Of 55 inspections made during July and August, 13 places were reported to be in good condition; 34 in fair condition; and 8 in unsanitary condition. Seventeen of these 55 establishments were being operated without a permit from the local authorities. One establishment, operating under a permit, was doing simultaneously a bottling business and a wet wash laundry business, although the owner claimed that he conducted each operation on a different day from which he carried on the other business. Were it not for the fact that flavored sugar solutions are not an ideal media for the growth of bacteria, and that carbon dioxide under pressure has an inhibitive action on the growth of bacteria, this industry would leave a trail of pestilence behind it.

A summary of the food samples examined will be found in table 4.

DRUGS.

There were 433 samples of drugs examined, of which 83 were found to be adulterated. It was found necessary to make 8 prosecutions for the sale of these adulterated drugs. The law requires the inspector to make a sealed sample at the time the sample is taken which often works to the detriment of the citizens of the commonwealth. In the City of Springfield it was found very difficult for the inspectors to obtain adulterated samples in the retail drug stores, although persons not inspectors were able to obtain such samples.

An employee of the Department, not connected with the inspectional force, went to Springfield with one of the inspectors, and purchased in the various drug stores the article desired. As soon as this employee came out of the store, the inspector who was waiting outside received the sample, numbered it, and placed it in his bag. After sufficient samples had been obtained, the two men made a second trip, the inspector entered the store and asked for a sample of the drug in question. He was informed by the proprietor, who knew him, that he was all out of the material. The other man was then called in and the proprietor was informed that he had sold this other man a sample a few hours prior. This the proprietor admitted and he was then given a sealed sample by the inspector. When the inspector visited the second store he arrived just as the proprietor was pouring down the sink the contents of all his bottles of this particular drug, and when he

arrived at the third store he found the empty bottles in the neighborhood of the sink. No doubt some telephone communication had been transmitted by the proprietor of the first store. Wherever the goods in question were found to be below the requirements of the pharmacopœia, these particular druggists were prosecuted. Many of the drugs were found to conform to the requirements of the pharmacopœia including those sold by some of the men who disposed of their available stock down the sink.

The samples of double strength tincture of ginger were found to be more nearly in accord with the requirements of the Department than during the previous year.

The summary of the analyses of drugs will be found in table 5.

LIQUOR.

There has been an increase in the samples of liquor submitted by Police Departments. The police authorities submitted 6,799 samples, which was 432 more than was submitted in 1923, and 1,033 more than was submitted in 1922. There has been an increase in the beer, wine, and alcohol samples, and a slight decrease in the distilled liquor samples.

Considerable demands are being made for a more detailed analysis than is customary. In many instances it is desired that the sample be specifically tested for substances other than water. In some instances still residues are submitted for identification in order that the nature of the substance from which the alleged liquor was distilled may be ascertained. Requests are received for the detection of the possible presence of special denaturants. Requests are received for experimental data as to the possibility of utilizing certain commercial preparations and obtaining from them preparations similar to the article involved in the prosecution. This is taking more time in the laboratory. The Courts are more frequently requiring the presence of the analyst, and the indications are that the force must be enlarged unless the general public realizes that the prohibition law was made to be obeyed.

Because of this increased amount of work, it is desirable that the analytical work be carried out as quickly and accurately as possible. Miss Ware and Mr. Hall of this Division have carried out an interesting piece of scientific investigation upon the refractive index and specific gravity of mixtures of alcohol, water, and sugar. As the result of this work, tables have been prepared whereby the percentage of alcohol in distilled liquors can be determined accurately without distillation, and if the amount of substances other than alcohol and water is less than .5 of 1% the alcohol can be determined more accurately by these methods than by subjecting the articles to distillation as the preliminary step in the analysis. By applying this method not only is time saved, but the work is done with practically no loss of sample, and additional tests can therefore be made if necessary.

Table 6 gives a summary of the results of these examinations.

COLD STORAGE.

Except for violations of the cold storage egg law, there have been comparatively few violations of the cold storage laws. It was found necessary to make three prosecutions for failure to display the cold storage goods sign required by statute.

A number of extensions were granted for holding goods in storage more than one year. There was a surplus of frozen eggs, many of which were frozen in China, and there was also a surplus of frozen poultry. Extensions were requested and granted for holding considerable quantities of pork. Much of this material upon which extensions were granted was removed from storage at a financial loss to the owners.

There was a surplus of frozen halibut upon which extensions were granted, and there was also a surplus of mackerel.

Requests for extension of time were refused on a number of articles, and a large amount of material was ordered out of storage at the close of the twelve months' storage permitted by statute.

The details of our actions upon extension requests will be found in tables 7, 8, and 9.

There were sixty-two warehouses licensed during the year. These warehouses submit monthly reports to the Department. A summary of these reports will be found in tables 10 and 11.

SLAUGHTERING.

The inspectors have been busy in the usual routine work of investigating nominees for the position of local inspectors of slaughtering; in instructing suitable candidates for such positions; in investigating the work of the local inspectors; and in enforcing the laws where violations have been discovered. In general, this work is carried out in accordance with the law on the part of the bulk of the slaughtering inspectors.

Most of the names submitted for approval were those of men who were holding office and who had given satisfactory service in the past. Two men whose services were unsatisfactory were disapproved and were replaced by men who are now doing satisfactory work. One case involving several violations is worthy of notice.

One Ferdinand Leuchtenberger of Adams had a slaughterhouse license and slaughtered a cow in the absence of the inspector. This cow was dressed, the meat was removed from the bones and packed in barrels. The barrels of beef were then sent to a sausage factory in Adams, and the bones were sent to the rendering works at North Adams. Prior to this, a sample of sausages containing more cereal than permitted by statute was obtained from Mr. Leuchtenberger. He was prosecuted for selling adulterated sausages; for slaughtering in the absence of a duly appointed inspector; and for delivering diseased meat for use as food. He was found guilty on the first two cases, but found not guilty on the case for delivering diseased meat.

The cases involving Mr. Ralph S. Stone and Mr. Ernest C. Burnham of Athol were called to the attention of this Department because of illegal inspection of reacting cattle. Mr. Burnham was the inspector, and Mr. Stone was authorized by the board of health to carry out this work, but Mr. Stone's name had not been submitted to this Department for approval. Both men were found not guilty on purely technical grounds. In the case of Mr. Stone the defendant's lawyer claimed that the Government had not produced proper evidence to show that he was not a member of the local board of health. Shortly after this occurred, the board of health sent Mr. Stone's name into the Department, and inasmuch as he was properly qualified to do the work, he was approved.

The cases against Robert E. Carpenter and Herbert F. Young of Orange which were quashed were first tried on October 29. After the trial the lawyer for the defence filed motions to quash because of technical errors in the complaint. The judge allowed this, and the cases were tried again on November 13 under a new complaint, resulting in conviction. An appeal was taken. At the same time, Mr. Carpenter was prosecuted under the new sanitary food law for operating an unsanitary slaughterhouse. Evidence was submitted from the local authorities that the slaughterhouse was unsanitary. The evidence of the inspector of this Department showed it was unsanitary, but when the case came to trial, the local officer testified that in his opinion the place was sanitary. The case was therefore lost.

BAKERIES.

There were 150 bakeries inspected, and defects were noted as follows:

In 61 instances the floors were not properly constructed or maintained; in 46 instances the walls were not properly constructed or maintained; in 33 instances the ceilings were not properly constructed or maintained; in 14 instances storage facilities were not properly constructed or maintained; in 23 instances apparatus was not properly constructed or maintained; in 32 instances stock was not properly protected; in 57 instances products were not properly protected; in 8 instances flies were abundant; in 22 instances flour storage was unsatisfactory; in 5 instances tobacco was used in the bakery; in 43 instances there was absence of a garbage can; in one instance there were domestic rooms connected with the bakery; and in 43 instances there were miscellaneous defects.

These defects were referred to the attention of the local boards of health for rectification.

SANITARY FOOD LAW.

In addition to sanitary inspection of soft drink factories and slaughterhouses, routine investigations were made of ice cream factories, many of which were found to be in decidedly unsanitary condition. The proprietors of these establishments were called before the Director of the Division for hearings. The results of these

inspections were presented to the proprietors and they were told that prosecutions would be instituted if subsequent inspections showed that the defects pointed out had not been remedied. During the month of December, sanitary inspections were begun in candy factories. These inspections will be continued during the early part of the next fiscal year.

MATTRESSES.

Investigations were made as usual, and violations were discovered in many instances. It was possible to make prosecutions against seven manufacturers of which five were convicted. The cases against the two others were dismissed.

It is a fact that considerable second hand material is being used in cheap mattresses, and these mattresses are being sold labeled as containing new material. Obtaining evidence of the use of second hand material is unusually difficult because the second hand tags can be readily removed from the material after it is received at the factory. After the material has gone through the cleaning machinery, it can no longer be identified as second hand and there is no adequate method of ascertaining from the examination of a mattress whether the filling is new or second hand. The fact that the mattress may be sold at less than the cost of new material is no evidence that the material is not new, as it is a well recognized fact that people may and often do sell goods at less than cost price.

During 1923, two men engaged in the mattress business were fined four hundred dollars (\$400.00) in all. These cases were appealed, and in the Superior Court one man was found not guilty. The other man was found guilty by the jury, and a fine of one hundred dollars (\$100.00) was assessed and paid.

COAL.

A number of complaints were received from citizens of the state, which complaints were investigated. A number of samples were submitted by local sealers of weights and measures and by the Division of Standards of the Department of Labor and Industries. Prosecutions were made on two samples on evidence collected by this Department, resulting in conviction. The chemists of this Division furnished evidence for other departments in other prosecutions.

In October, Mrs. B. H. Eden, Mr. S. H. Hall, and Mr. C. E. Marsh of this Division prepared a paper on "What Constitutes an Unreasonable Amount of Impurity in Anthracite Coal." This paper contained the results of more than three hundred analyses of anthracite coal made by the Division and was presented before the Northeastern Section of the American Chemical Society. It will appear in the January issue of "The Retail Coalman."

ARSPHENAMINE.

Owing to a change in ownership, and consequent change in surroundings, it was necessary to move the arspenamine laboratory. The new quarters are far larger than the old quarters, and are much more satisfactory.

The laboratory has been able to furnish a sufficient supply of arspenamine and sulpharsphenamine of satisfactory quality. Dr. Reid Hunt has been doing the pharmacological work. One sample of arspenamine was tested in connection with some tests upon the various commercial samples and was found to be superior to such samples. The distribution of arspenamine has declined somewhat, but that of sulpharsphenamine has been increasing, probably owing to its ease in administration and lower toxicity.

TABLE 1. *For Sale of Milk not of Good Standard Quality.*

NAMES.	Address.	Court.	Date.	Result.
Anastos, William D.	Fitchburg	Fitchburg	June 13, 1924	Conviction.
Anthony, Gust	Springfield	Springfield	Oct. 16, 1924	Conviction.
Baruth, John	Ayer	Ayer	July 17, 1924	Conviction.
Bellas, Peter	Chicopee	Chicopee	Apr. 25, 1924	Conviction.
Berestka, Stephen A.	Chicopee	Chicopee	Apr. 25, 1924	Conviction.
Caras, Alex	Taunton	Taunton	July 18, 1924	Conviction.
Cardin, Peter	Winchendon	Winchendon	Sept. 17, 1924	Conviction.
Casey, John	Great Barrington	Great Barrington	Sept. 24, 1924	Conviction.
Chaniss, William	Holyoke	Holyoke	May 9, 1924	Conviction.
Christy, Matthew	Springfield	Springfield	Oct. 23, 1924	Conviction.
Cocker, Florence	Great Barrington	Great Barrington	Nov. 10, 1924	Conviction.
✓ Colias, John	Pittsfield	Pittsfield	Oct. 9, 1924	Conviction.
Cote, Fred L.	Holyoke	Holyoke	May 9, 1924	Conviction.
Counalis, Harry	Stoneham	Woburn	May 6, 1924	Conviction.
Counalis, Harry	Stoneham	Woburn	May 6, 1924	Conviction.
Cousoule, Henry	Newburyport	Newburyport	May 19, 1924	Conviction.
Dabrillo, John	Worcester	Worcester	June 19, 1924	Conviction.
Darcy, Emil J.	Chicopee Falls	Chicopee	Apr. 25, 1924	Conviction.
Davis, Walter H.	Taunton	Taunton	July 18, 1924	Conviction.
Denkwicz, Frank	Springfield	Springfield	Mar. 5, 1924	Conviction.
Dery, Fred	Winchendon	Winchendon	Sept. 17, 1924	Conviction.
Donnelly, Francis	Haverhill	Haverhill	Nov. 15, 1924	Conviction.
Douvris, Harry	Woburn	Woburn	June 27, 1924	Conviction.
Eliopoulos, Charles	Ipswich	Ipswich	Aug. 15, 1924	Conviction.
Eliopoulos, Charles	Ipswich	Ipswich	Aug. 15, 1924	Conviction.
Equi, Chris.	Holyoke	Holyoke	Aug. 21, 1924	Conviction.
Fagas, William	Salisbury	Amesbury	July 30, 1924	Conviction.
Fitchburg Bon Ton Restaurant, Inc.	Fitchburg	Fitchburg	June 13, 1924	Conviction.
Fong Ying, John	Fitchburg	Fitchburg	June 13, 1924	Conviction.
Franz, Joseph	Springfield	Springfield	Feb. 28, 1924	Conviction.
Frauley, Thos. J.	Holyoke	Holyoke	May 9, 1924	Conviction.
Gaitanaris, Demetrios	Stoneham	Woburn	May 6, 1924	Conviction.
Gaitanaris, Demetrios	Stoneham	Woburn	May 6, 1924	Conviction.
Galipeau, Polydore	Holyoke	Holyoke	Aug. 21, 1924	Conviction.
Gausia, Michael	Northampton	Northampton	June 24, 1924	Conviction.
Gelep, Gus	Leominster	Leominster	June 25, 1924	Conviction.
Geragotelis, Harry	Natick	Natick	June 26, 1924	Conviction.
Gerontinos, Michael	Springfield	Springfield	Oct. 23, 1924	Conviction.
Giana, Louis	Chatham	Harwich	Sept. 19, 1924	Conviction.
Gianakas, Paul	Ipswich	Ipswich	Aug. 15, 1924	Conviction.
Giosasi, Michael H.	Worcester	Worcester	May 22, 1924	Conviction.
Golder, Frank E.	Leominster	Leominster	June 25, 1924	Conviction.
Graham, Thomas	Great Barrington	Great Barrington	Sept. 24, 1924	Conviction.
Gravel, Ernest J.	Ware	Ware	Apr. 18, 1924	Conviction.
Green, Frank	Worcester	Worcester	June 27, 1924	Conviction.
Hersey, Leonard	Beverly	Salem	May 21, 1924	Conviction.
Himell, Jack	Worcester	Worcester	June 19, 1924	Conviction. ¹
Himells, Jack	Worcester	Worcester	May 22, 1924	Conviction.
Jais, Alfonse	Springfield	Springfield	Oct. 31, 1924	Conviction.
Jokinen, John	Fitchburg	Fitchburg	May 9, 1924	Conviction.
Kantanoles, Kyerakos	Chicopee	Chicopee	Apr. 25, 1924	Conviction.
Karus, George	Taunton	Taunton	Aug. 1, 1924	Discharged.
Karzakas, Augustus	Springfield	Springfield	Nov. 14, 1924	Conviction.
Keegan, Patrick	Great Barrington	Great Barrington	Sept. 24, 1924	Conviction.
Kostas, John	Chicopee Falls	Chicopee	Apr. 25, 1924	Conviction.
Lapham, Samuel P.	Norwood	Dedham	Jan. 30, 1924	Conviction.
Larrabee, Berkley T.	Ayer	Ayer	July 17, 1924	Conviction.
Leavitt, David	Revere	Chelsea	Sept. 9, 1924	Conviction.
Lehtonen, Elvi	Fitchburg	Fitchburg	May 9, 1924	Discharged.
Lucas, Charles	Marlborough	Marlborough	June 26, 1924	Conviction.
Marinos, James	Plymouth	Plymouth	July 25, 1924	Conviction.
Marinos, Peter	Plymouth	Plymouth	July 25, 1924	Conviction.
Markey, Frank H.	Marlborough	Marlborough	June 26, 1924	Conviction.
Martiris, Charles	Worcester	Worcester	June 19, 1924	Conviction.
Mavros, Andrew	Revere	Chelsea	Sept. 9, 1924	Conviction.
Mazzolini, John	Holyoke	Holyoke	Aug. 21, 1924	Conviction.
Mendelin, Torsten	Fitchburg	Fitchburg	Mar. 9, 1924	Conviction.
Metros, James	Worcester	Worcester	Sept. 16, 1924	Conviction.
Mustonen, Michael	Fitchburg	Fitchburg	May 9, 1924	Conviction.
Nicholas, John J.	Worcester	Worcester	June 19, 1924	Conviction.
Oberle, Ceeile	Great Barrington	Great Barrington	Nov. 10, 1924	Conviction.
O'Brien, Edward J.	Leominster	Leominster	June 25, 1924	Conviction.
O'Brien, John A.	Lexington	Concord	Nov. 21, 1924	Conviction.
Overland Stores Company	Worcester	Worcester	May 22, 1924	Conviction. ¹
Pappadales, Basil S.	Natick	Natick	July 10, 1924	Conviction.
Pappas, George	Holyoke	Holyoke	May 9, 1924	Conviction.
Pappas, Peter	Springfield	Springfield	Oct. 16, 1924	Conviction.
Parker, Truman E.	Great Barrington	Great Barrington	Sept. 24, 1924	Conviction.
Peterson, Douglas	Holyoke	Holyoke	May 15, 1924	Conviction.
Peterson, Walter	Holyoke	Holyoke	May 15, 1924	Conviction.
Polley, Mary	Leominster	Leominster	June 25, 1924	Conviction.
Rapacki, Henry	Holyoke	Holyoke	May 9, 1924	Conviction.
Rapacki, Henry	Holyoke	Holyoke	Aug. 21, 1924	Conviction.
Resnik, Max	Springfield	Springfield	Mar. 5, 1924	Conviction.

¹ Appealed.

For Sale of Milk not of Good Standard Quality — Concluded.

NAME.	Address.	Court.	Date.	Result.
Roberts, Alfred	Chicopee Falls	Chicopee	Apr. 25, 1924	Conviction.
Robichaud, William	Greenfield	Greenfield	Aug. 14, 1924	Conviction.
Rochilla, Salvatore	Springfield	Springfield	Oct. 31, 1924	Conviction.
Royal Baking Company	Worcester	Worcester	June 13, 1924	Conviction.
Rozman, William	Springfield	Springfield	Mar. 5, 1924	Conviction.
Saites, James	Springfield	Springfield	Nov. 7, 1924	Conviction.
Samitas, Fanis	Fall River	Fall River	July 18, 1924	Conviction.
Sarras, Charles M. & James R.	Amherst	Northampton	July 22, 1924	Discharged.
Schultz, William	Great Barrington	Great Barrington	Sept. 24, 1924	Conviction.
Serrao, Rocco	Pittsfield	Pittsfield	Oct. 10, 1924	Conviction.
Sharameta, Charles	Worcester	Worcester	June 13, 1924	Conviction.
Smith, James	Ware	Ware	Apr. 18, 1924	Conviction.
Stein, Abraham	Springfield	Springfield	Oct. 23, 1924	Conviction.
Stines, John	Worcester	Worcester	June 13, 1924	Conviction.
Stopa, Joseph	Holyoke	Holyoke	May 9, 1924	Conviction.
Sturnis, George	Holyoke	Holyoke	May 9, 1924	Conviction.
Sullivan, James J.	Worcester	Worcester	June 13, 1924	Conviction. ¹
Tabaras & Ingargiola	Taunton	Taunton	July 18, 1924	Conviction.
Teresliko, Anthony	Holyoke	Holyoke	May 9, 1924	Conviction.
Thomas, Arthur	Worcester	Worcester	May 22, 1924	Conviction.
Thomas, Charles	Worcester	Worcester	June 13, 1924	Conviction.
Tilton, Byron O.	Greenfield	Greenfield	Aug. 14, 1924	Conviction.
Tobin, Katherine E.	Greenfield	Greenfield	Aug. 14, 1924	Conviction.
Tomporis, George	Worcester	Worcester	May 22, 1924	Conviction.
Tzoullos, Angelo	Worcester	Worcester	Sept. 16, 1924	Conviction.
Vesos, Zisis	Fall River	Fall River	July 18, 1924	Conviction.
Vlahos, George	Fall River	Fall River	July 18, 1924	Conviction.
Vrahnos, Nicholas	Pittsfield	Pittsfield	Oct. 10, 1924	Conviction.
Wacylyzk, John	Northampton	Northampton	June 24, 1924	Conviction.
Waldorf System, Inc.	Worcester	Worcester	May 22, 1924	Conviction.
Waldorf System, Inc.	Worcester	Worcester	May 22, 1924	Conviction.
Webster, Edward H.	Worcester	Worcester	Oct. 21, 1924	Conviction.
Wedge, Joseph	Leominster	Leominster	June 25, 1924	Conviction.
Wolf, Solomon	Revere	Chelsea	Sept. 9, 1924	Conviction.
Woodwell, Frank A.	Newburyport	Newburyport	May 19, 1924	Conviction.

For Sale of Milk from which a Portion of the Cream had been removed.

Dooley, William C.	Taunton	Taunton	Aug. 1, 1924	Conviction.
Dumas, Joseph	Dudley	Webster	June 24, 1924	Conviction.
Gouronnes, Nicholas	Worcester	Worcester	June 13, 1924	Conviction.
Manuell, James	Springfield	Springfield	Jan. 24, 1924	Conviction.
Miller Brothers	Hudson	Hudson	June 18, 1924	Conviction.
Moskos, Nicholas	Framingham	Framingham	June 11, 1924	Conviction.
R. & R. Bakery & Lunch	Worcester	Worcester	June 13, 1924	Conviction.
Robertshaw, Joseph	North Tiverton, R. I.	Fall River	Jan. 22, 1924	Conviction.
Waldorf System, Inc.	Salem	Salem	Apr. 29, 1924	Conviction. ¹

For Sale of Milk containing Added Water.

Almedia, Manuel	Dartmouth	New Bedford	Dec. 3, 1923	Conviction.
Blumer, Charles W.	West Holyoke	Holyoke	Sept. 23, 1924	Conviction.
Brown, Lewis A.	Rowley	Newburyport	June 16, 1924	Conviction.
Costa, Joseph	Dartmouth	New Bedford	Dec. 3, 1923	Conviction.
Costa, Manuel	North Dartmouth	New Bedford	Oct. 7, 1924	Conviction.
Cummings, Everett	Woburn	Woburn	Mar. 17, 1924	Discharged.
Dole, John T.	West Newbury	Newburyport	Apr. 30, 1924	Conviction.
Durant, Charles	Leominster	Leominster	Aug. 15, 1924	Conviction.
Ferria, Julia	Dartmouth	New Bedford	Dec. 7, 1923	Conviction.
Hohn, James L.	Nantucket	Nantucket	Aug. 26, 1924	Conviction.
Josephson, John	Sutton	Worcester	Oct. 21, 1924	Conviction.
Kileine, Walter	Sutton	Worcester	Oct. 21, 1924	Conviction.
Koshivas, Charles	Medway	Franklin	June 26, 1924	Conviction.
Krutz, Adam	West Holyoke	Holyoke	Sept. 23, 1924	Conviction.
Mark, Bento	Fall River	Fall River	Feb. 26, 1924	Conviction.
Mederios, Manuel	South Dartmouth	New Bedford	Dec. 18, 1923	Conviction.
Mederios, Manuel	South Dartmouth	New Bedford	Oct. 14, 1924	Conviction.
Mercier, Fred	Granby	Northampton	July 17, 1924	Conviction.
Mitchell, Joseph	West Acton	Concord	Feb. 7, 1924	Conviction.
Peters, Nicholas	Springfield	Springfield	Nov. 21, 1924	Conviction.
Proctor, Warren	Lunenburg	Leominster	Nov. 12, 1924	Conviction.
Rogers, Eli T.	Beverly	Salem	May 21, 1924	Conviction.
Seabury, Robert F.	North Dartmouth	New Bedford	Dec. 4, 1923	Conviction.
Smith, Lillian	Belchertown	Northampton	July 17, 1924	Conviction.
Sousa, Antone	Somerset	Fall River	Feb. 5, 1924	Conviction.
Stearns, Clifford E.	Lexington	Waltham	Dec. 13, 1923	Conviction. ¹
Steele, Joseph	Provincetown	Provincetown	Aug. 28, 1924	Conviction.
Szloetka, Antone	Granby	Northampton	July 17, 1924	Conviction.
Tarvis, Frank	Somerset	Fall River	Jan. 22, 1924	Conviction.
Topping, Fred	Sheffield	Great Barrington	Nov. 10, 1924	Conviction.
Trigg, Fred	Sagamore	Barnstable	Aug. 25, 1924	Conviction.
Tupper, Frank	Andover	Andover	Jan. 18, 1924	Conviction.
Vallee, Antoine D.	Leominster	Leominster	Aug. 15, 1924	Dismissed.

¹ Appealed.

*For Sale of Adulterated Foods Other than Milk.**Butter.*

[Contained excess water.]

NAME.	Address.	Court.	Date.	Result.
Gold, Carl	Springfield	Springfield	May 9, 1924	Conviction.
Rabinovitz, Max	Springfield	Springfield	Jan. 24, 1924	Conviction.
Rabinovitz, Max	Springfield	Springfield	May 9, 1924	Conviction.
Widlansky, Isaac	Springfield	Springfield	Jan. 24, 1924	Conviction.

Butter.

[Manufacturing Butter containing less than 80 per cent of milk fat in violation of the rules and regulations.]

Rabinovitz, Max	Springfield	Springfield	Jan. 24, 1924	Conviction.
Widlansky, Isaac	Springfield	Springfield	Jan. 24, 1924	Conviction.

Clams.

[Contained added water.]

Fitz, Warren P.	Salem	Salem	June 25, 1924	Dismissed.
Lane, Oscar S.	Peabody	Peabody	June 19, 1924	Discharged.
Stopford Company, William	Beverly	Salem	June 25, 1924	Dismissed.

Extract of Vanilla.

[Adulterated with coumarin.]

American Proprietary Syndicate	Malden	Malden	May 15, 1924	Conviction.
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Extract of Vanilla.

[Misbranded Imitation Vanilla Extract.]

Rubinwich, Edward H.	Springfield	Springfield	May 9, 1924	Conviction.
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Maple Sugar.

[Contained cane sugar.]

Dallas, Stephen	Worcester	Worcester	May 22, 1924	Conviction.
Janigian, Moses	Worcester	Worcester	May 22, 1924	Conviction.

Olive Oil.

[Adulterated with cottonseed oil.]

Armenis, George	Boston	Peabody	Jan. 28, 1924	Dismissed.
Bucovalas, Michael	Lowell	Lowell	Jan. 21, 1924	Conviction.
Kokenakas, George E.	Boston	Boston	Apr. 5, 1924	Conviction.
Sparages, James	Cambridge	Cambridge	Mar. 25, 1924	Conviction.

Olive Oil.

[Misbranded salad oil.]

Armenis, George	Boston	Boston	June 3, 1924	Conviction.
Kokenakas, George E.	Boston	Boston	Apr. 5, 1924	Conviction.
Sparages, James	Cambridge	Cambridge	Mar. 25, 1924	Conviction.

Hamburg Steak.

[Selling, or offering for sale, meat containing sodium sulphite in violation of the Regulations of the Department of Public Health.]

Bassinov, Isaac	Worcester	Worcester	Mar. 18, 1924	Conviction. ¹
Jacobson, Max	Worcester	Worcester	Mar. 18, 1924	Conviction. ¹
Mindick, Joseph	Worcester	Worcester	Mar. 18, 1924	Conviction. ¹

Sausage.

[Contained starch in excess of 2 per cent.]

Leuchtenberger, Ferdinand	Adams	Adams	Jan. 30, 1924	Conviction.
Wojtaszek, John	Adams	Adams	Dec. 7, 1924	Conviction.
Wojtaszek, John	Adams	Pittsfield	Mar. 6, 1924	Conviction.

Sausage.

[Contained coloring matter.]

Colonial Provision Company, Inc.	Boston	Lawrence	Feb. 1, 1924	Conviction. ¹
Grey, Julius (2 counts)	Boston	Quincy	Dec. 14, 1923	Conviction.
Kirschner, Frank	Haverhill	Haverhill	Feb. 29, 1924	Conviction.
Kressler, Meyer	Somerville	Somerville	Apr. 28, 1924	Conviction.
National Packing Company	Boston	Boston	Apr. 8, 1924	Discharged.
Shnider, Phillip	Lowell	Lowell	Jan. 31, 1924	Conviction.
Shnider, Phillip	Lowell	Lowell	Jan. 31, 1924	Conviction.
Weiner, Abraham	Mattapan	West Roxbury	Mar. 7, 1924	Conviction.

¹ Appealed.

Soft Drinks.

[Contained saccharine.]

NAME.	Address.	Court.	Date.	Result.
Arguras, John	Peabody	Peabody	Sept. 15, 1924	Conviction.
Blatchford, Gilman G. . . .	Gloucester	Gloucester	Aug. 6, 1924	Conviction.
Brazell, Thomas	Gardner	Gardner	Oct. 3, 1924	Conviction.
Butler, Isaac	Chelsea	Chelsea	Sept. 24, 1924	Conviction.
Cafasso, Chester & Eugene Juliam	Everett	Malden	Sept. 30, 1924	Conviction.
Desplaines, O. J. . . .	Southbridge	Southbridge	Oct. 17, 1924	Conviction.
French, Charles P. . . .	Medford	Malden	Sept. 30, 1924	Conviction.
Great Barrington Bottling Works, Inc. . . .	Great Barrington	Great Barrington	Sept. 24, 1924	Conviction.
Great Barrington Bottling Works, Inc. . . .	Great Barrington	Great Barrington	Nov. 10, 1924	Conviction.
Hanula & Son	Gardner	Gardner	Oct. 3, 1924	Conviction.
Kaplan, Meyer	Pittsfield	Pittsfield	Oct. 9, 1924	Conviction. ¹
Kaplan, Meyer	Pittsfield	Pittsfield	Nov. 20, 1924	Discharged.
Tourigny, Adolph	Gardner	Gardner	Oct. 3, 1924	Conviction.

Vinegar.

[Low in acid.]

Dupius, Adjutor	Fall River	Fall River	Apr. 16, 1924	Conviction.
Levis, Charles	Fall River	Fall River	Apr. 23, 1924	Conviction.

*Eggs.**Decomposed; Unfit for Food.*

Heslor & Co., J., Inc. . . .	Worcester	Fitchburg	Feb. 5, 1924	Conviction.
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False Advertising — Sale of Eggs which were not Fresh as Fresh Eggs.

Albany Cash Market, Inc. . . .	Pittsfield	Pittsfield	Jan. 9, 1924	Conviction.
The Ginter Company	Springfield	Springfield	Dec. 6, 1923	Conviction.
Kronich, Meyer	North Adams	North Adams	Dec. 14, 1923	Conviction.
Tillman, Isadore	Springfield	Springfield	Dec. 6, 1923	Conviction.
Uretzsky, Louis	Springfield	Springfield	Dec. 6, 1923	Conviction.

Misbranded.

The Ginter Company	Springfield	Springfield	Dec. 6, 1923	Conviction.
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Selling Cold-Storage Eggs without Marking the Container.

Argento, Phillip	Worcester	Worcester	Jan. 29, 1924	Conviction. ¹
Balchunas, Stanislaw	Lawrence	Lawrence	Dec. 10, 1923	Conviction.
Bass, Israel	Boston	Boston	Nov. 26, 1924	Conviction.
Bucuales, Michael	Lowell	Lowell	Jan. 21, 1924	Conviction.
Budz, Andrew	Housatonic	Great Barrington	Nov. 11, 1924	Conviction.
Carlo, James	Pittsfield	Pittsfield	Nov. 20, 1924	Conviction.
Chirichiallo, Frank	Worcester	Worcester	Jan. 29, 1924	Conviction.
Cocorochino, Ralph	Lawrence	Lawrence	Feb. 1, 1924	Conviction.
Cohen, Jacob	Quincy	Quincy	Dec. 14, 1923	Conviction.
Cooperative General Store, Inc. . . .	Adams	Adams	Dec. 7, 1923	Conviction.
Covitz, Herbert	Boston	Boston	Nov. 26, 1924	Conviction.
Dakos, Monthos	Peabody	Peabody	Dec. 14, 1923	Conviction.
Derrico, Vincent	Worcester	Worcester	Jan. 29, 1924	Conviction. ¹
Duluzio, Donald	Worcester	Worcester	Jan. 29, 1924	Conviction.
Eastern Creamery Company, Inc. . . .	Worcester	Worcester	Dec. 27, 1923	Conviction.
Ellis, Anthony	Gloucester	Gloucester	Dec. 4, 1923	Discharged.
Feldman, Louis	Boston	Boston	Nov. 26, 1924	Conviction.
Ferraro, Antonio	Worcester	Worcester	Jan. 29, 1924	Conviction.
Fiachino, Carlo	Lawrence	Lawrence	Feb. 1, 1924	Conviction.
Flax, Carl	Boston	Boston	Nov. 26, 1924	Conviction.
Florio, Antonio	Leominster	Leominster	Dec. 12, 1923	Conviction.
Franciosi, Caesar	Leominster	Leominster	Dec. 12, 1923	Conviction.
Fratas, John N. . . .	Lowell	Lowell	Jan. 31, 1924	Conviction.
Gallo, John	Worcester	Worcester	Jan. 29, 1924	Conviction.
Ganellas, Christos	Lowell	Lowell	Jan. 3, 1924	Conviction.
Gangi, Filadelfino	Lawrence	Lawrence	Dec. 10, 1923	Conviction.
Gorman, John	Pittsfield	Pittsfield	Nov. 20, 1923	Conviction.
Guerra, Angelo	Worcester	Worcester	Jan. 29, 1924	Conviction.
Ivaldi, James	Boston	Boston	Nov. 26, 1924	Conviction.
Jacobs, Isador	Boston	Boston	Nov. 26, 1924	Conviction.
Kalieva, Daniel	Springfield	Springfield	Nov. 1, 1924	Conviction.
Katsos, Theodore	Boston	Boston	Nov. 26, 1924	Conviction.
Katz, Morris	Malden	Malden	Mar. 25, 1924	Conviction.
Kyronz, Simon G. . . .	Gloucester	Gloucester	Dec. 4, 1923	Conviction.
Leavitt, Morris	Pittsfield	Pittsfield	Nov. 20, 1924	Conviction.
Levy, John A. . . .	Salem	Salem	Dec. 13, 1923	Conviction.
Loza, Jacob	Lawrence	Lawrence	Dec. 10, 1923	Conviction.
Marshallman, Morris	Malden	Malden	Mar. 10, 1924	Conviction.
Masiello, Domenico	Worcester	Worcester	Jan. 29, 1924	Conviction.

¹ Appealed.

Selling Cold-Storage Eggs without Marking the Container — Concluded.

NAME.	Address.	Court.	Date.	Result.
Moscardini, Michael . . .	Boston . . .	Boston . . .	Nov. 26, 1924	Conviction.
Naberezny, Peter . . .	Lowell . . .	Lowell . . .	Jan. 21, 1924	Conviction.
Pasquarello, Joseph . . .	Worcester . . .	Worcester . . .	Jan. 29, 1924	Conviction.
Patsovakos, Peter . . .	Lowell . . .	Lowell . . .	Jan. 3, 1924	Conviction.
Pinmatto, Angelo . . .	Lawrence . . .	Lawrence . . .	Feb. 1, 1924	Conviction.
Pistaro, John . . .	Worcester . . .	Worcester . . .	Jan. 29, 1924	Conviction.
Ptak, Wladislaw . . .	Housatonic . . .	Great Barrington . . .	Nov. 11, 1924	Conviction.
Raizin, Benjamin . . .	Gloucester . . .	Gloucester . . .	Dec. 4, 1923	Conviction.
Raymond, John . . .	Gloucester . . .	Gloucester . . .	Dec. 4, 1923	Conviction.
Robinson, Morris . . .	Pittsfield . . .	Pittsfield . . .	Nov. 20, 1924	Conviction.
Rodopolous, Peter . . .	Lowell . . .	Lowell . . .	Jan. 3, 1924	Conviction.
Roy, Eugene F. . . .	Pittsfield . . .	Pittsfield . . .	Nov. 20, 1924	Conviction.
Ruberto, Michael . . .	Pittsfield . . .	Pittsfield . . .	Nov. 20, 1924	Conviction.
Saffie, James . . .	Lawrence . . .	Lawrence . . .	Jan. 17, 1924	Conviction.
Sakorecz, John . . .	Lawrence . . .	Lawrence . . .	Feb. 1, 1924	Conviction.
Salah, Kalal . . .	Gloucester . . .	Gloucester . . .	Dec. 4, 1923	Conviction.
Salah, Toffur . . .	Gloucester . . .	Gloucester . . .	Dec. 4, 1923	Conviction.
Seiluci, Frank . . .	Worcester . . .	Worcester . . .	Jan. 29, 1924	Conviction.
Silva, George . . .	Lawrence . . .	Lawrence . . .	Dec. 10, 1923	Conviction.
Spadafora, Ambrogio . . .	Pittsfield . . .	Pittsfield . . .	Nov. 20, 1924	Conviction.
Stanford, James . . .	Lawrence . . .	Lawrence . . .	Dec. 10, 1923	Conviction.
Stanin, James . . .	Lawrence . . .	Lawrence . . .	Feb. 1, 1924	Conviction.
Sullivan, John . . .	Pittsfield . . .	Pittsfield . . .	Nov. 20, 1924	Conviction.
Terlizei, Michael . . .	Worcester . . .	Worcester . . .	Jan. 29, 1924	Conviction. ¹
Weiner, William . . .	Malden . . .	Malden . . .	Mar. 25, 1924	Conviction. ¹
Wishnick, Abram . . .	Boston . . .	Boston . . .	Nov. 26, 1924	Conviction.
Wisnoski, Walter . . .	Lowell . . .	Lowell . . .	Jan. 3, 1924	Conviction.
Zaft, Abraham . . .	Lawrence . . .	Lawrence . . .	Feb. 1, 1924	Conviction.
Zappala, Samuel . . .	Lawrence . . .	Lawrence . . .	Dec. 10, 1923	Conviction.
Zinna, Nicholas . . .	Leominster . . .	Leominster . . .	Dec. 12, 1923	Conviction.
Zolota, John . . .	Peabody . . .	Peabody . . .	Dec. 14, 1923	Conviction.

Absence of Sign "Cold-Storage Eggs."

Katz, Benjamin . . .	Newburyport . . .	Newburyport . . .	Jan. 7, 1924	Conviction. ¹
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*For Sale of Decomposed Food.**Pork Kidney.*

Yocas, Paul M. . . .	Stoughton . . .	Stoughton . . .	Mar. 10, 1924	Conviction.
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*For Sale of Drugs Deficient in Strength.**Extract of Jamaica Ginger.*

Blanc, Neil . . .	Springfield . . .	Springfield . . .	May 27, 1924	Conviction.
Cohen, Israel . . .	Worcester . . .	Worcester . . .	Mar. 18, 1924	Discharged.
Greenberg, Samuel . . .	Springfield . . .	Springfield . . .	May 27, 1924	Conviction.
Star Spice Company . . .	Boston . . .	Boston . . .	Apr. 3, 1924	Conviction.
Star Spice Company . . .	Boston . . .	Boston . . .	Apr. 3, 1924	Conviction.

Spirit of Nitre.

Fisch, Assir N. . . .	Norwood . . .	Dedham . . .	Jan. 28, 1924	Conviction. ¹
McHugh, Peter F. . . .	Boston . . .	Dorchester . . .	Mar. 3, 1924	Conviction.

Tincture of Iodine.

Rubinwich, Edward H. . . .	Springfield . . .	Springfield . . .	May 9, 1924	Conviction.
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*For Violation of the Laws relative to Cold Storage.**Retailing Cold-Storage Goods without Displaying a Sign marked "Cold-Storage Goods Sold Here."*

Cohen, Jacob . . .	Quincy . . .	Quincy . . .	Dec. 14, 1923	Conviction.
Katz, Benjamin . . .	Newburyport . . .	Newburyport . . .	Jan. 7, 1924	Conviction. ¹
Solomon, Samuel . . .	Springfield . . .	Springfield . . .	Oct. 31, 1924	Conviction.

*For Violation of the Laws relative to Slaughtering.**Illegal Use of Stamp.*

Stone, Ralph S. . . .	Athol . . .	Athol . . .	Dec. 15, 1923	Discharged.
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Permitting the Use of Stamp by One not an Inspector.

Burnham, Ernest C. . . .	Athol . . .	Athol . . .	Dec. 15, 1923	Discharged.
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As Inspector of Slaughtering stamped a Carcass which he had not seen Slaughtered.

Havens, Edwin L. . . .	New Braintree . . .	East Brookfield . . .	Jan. 4, 1924	Conviction.
Havens, Edwin L. . . .	New Braintree . . .	East Brookfield . . .	Jan. 4, 1924	Conviction.

¹ Appealed.

Slaughtering in the Absence of Inspector.

NAME.	Address.	Court.	Date.	Result.
Barr, E. LeRoy	New Braintree	East Brookfield	Jan. 4, 1924	Discharged.
Barr, E. LeRoy	New Braintree	East Brookfield	Jan. 4, 1924	Discharged.
Carpenter, Robert E. . . .	Orange	Orange	Oct. 29, 1924	Quashed.
Carpenter, Robert E. . . .	Orange	Orange	Nov. 13, 1924	Conviction. ¹
Gauvin, Joseph	Methuen	Lawrence	Mar. 21, 1924	Conviction. ²
Leuchtenberger, Ferdinand	Adams	Adams	Jan. 29, 1924	Conviction.
Young, Herbert F. . . .	Orange	Orange	Oct. 29, 1924	Quashed.
Young, Herbert F. . . .	Orange	Orange	Nov. 13, 1924	Conviction. ¹

Delivering for Use as Food Diseased Meat.

Leuchtenberger, Ferdinand	Adams	Adams	Feb. 5, 1924	Discharged.
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For Violation of Coal Laws.

The Fisher Churchill Company ³	Dedham	Dedham	Mar. 26, 1924	Conviction.
Toomey, Timothy E. . . .	Wakefield	Malden	Apr. 2, 1924	Conviction. ¹

For Violation of Mattress Laws.

Feldman, Morris	Boston	Boston	July 2, 1924	Conviction.
Fishman, David	Lawrence	Lawrence	Feb. 14, 1924	Dismissed.
Fishman, Mitchell	Lawrence	Lawrence	Feb. 14, 1924	Dismissed.
Goldstein, Morris	Haverhill	Haverhill	Feb. 20, 1924	Conviction.
Handler, Samuel	Fitchburg	Fitchburg	Apr. 8, 1924	Conviction.
Miller, Max	Boston	Boston	July 2, 1924	Conviction.
Salem Mattress Company	Boston	Boston	Nov. 26, 1924	Conviction.

For Violation of Sanitary Food Laws.

Carpenter, Robert E. . . .	Orange	Orange	Oct. 29, 1924	Discharged.
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TABLE 2. — *Milk Statistics by Months.*

MONTH.	Number above Standard.	Number below Standard.	Total Samples Collected.	Milk with Cream Re-moved.	Watered Samples.	NUMBER OF SAMPLES VARYING BETWEEN —								
						15% and above.	14% and 15%.	13% and 14%.	12% and 13%.	11% and 12%.	10% and 11%.	9% and 10%.	8% and 9%.	Below 8%.
1923.														
December	252	95	347	1	19	3	9	31	209	79	10	2	2	2
1924.														
January	302	85	387	4	25	1	4	42	255	57	3	—	—	25
February	245	71	316	5	7	2	8	37	198	61	9	1	—	—
March	399	62	461	12	4	2	5	38	354	53	8	3	—	—
April	589	247	836	57	15	13	19	83	474	201	39	3	3	1
May	452	228	680	59	16	6	20	93	333	185	40	3	—	—
June	327	185	512	28	16	4	6	40	277	148	26	1	1	9
July	342	196	538	24	7	7	20	78	237	166	27	3	—	—
August	257	192	449	17	30	3	19	68	167	142	41	8	1	—
September	369	150	519	23	25	4	14	86	265	118	16	13	1	2
October	197	79	276	5	4	4	4	23	166	65	12	2	—	—
November	373	102	475	21	15	13	14	73	273	74	20	8	—	—
Totals	4,104	1,692	5,796	256	183	62	142	692	3,208	1,349	251	45	8	39

TABLE 3. — *Composition of Average Milk Samples not declared Adulterated.*

MONTH.	Number.	Total Solids (Per Cent).	Fat (Per Cent.)	Solids not Fat (Per Cent.)
1923.				
December	327	12.33	3.73	8.60
1924.				
January	358	12.41	3.80	8.61
February	304	12.48	3.85	8.63
March	445	12.80	3.87	8.93
April	764	12.65	3.88	8.77
May	537	12.37	3.81	8.56
June	468	12.26	3.74	8.52
July	487	12.94	4.06	8.88
August	402	12.40	3.82	8.58
September	471	12.53	3.95	8.58
October	267	12.29	3.77	8.52
November	331	12.74	4.08	8.66
Totals	5,211	12.54	3.86	8.68

¹ Appealed.² Continued for sentence.³ Evidence obtained by this Department; case prosecuted by Division of Standards.

TABLE 4. — *Total Analyses of Foods for the Past Year.*

CHARACTER OF SAMPLE.	Genuine.	Adulterated.	Total.
Butter	92	9	101
Candy	15	1	16
Canned Goods	26	6	32
Cider	2	—	2
Clams	34	25	59
Cocoa	7	—	7
Coffee	6	—	6
Cream	209	168	377
Eggs	16	—	16
Fish — Cold Storage	34	11	45
Flavoring Extracts	8	7	15
Fruit Syrups	9	—	9
Gelatin	2	—	2
Honey	148	—	148
Ice Cream	1	7	8
Maple Sugar	5	1	6
Maple Syrup	—	—	—
Meat Products:			
Kidneys	5	9	14
Kiszka	456	46	502
Sausage	12	3	15
Miscellaneous Foods			
Nuts	1	—	1
Olive Oil	40	12	52
Scallops	38	4	42
Soft Drinks	347	45	392
Spices	10	—	10
Strawberries	4	5	9
Vinegar	45	7	52
Mattress Fillings	5	—	5
	1,579	367	1,946

TABLE 5. — *Total Analyses of Drugs for the Past Year.*

CHARACTER OF SAMPLE.	Genuine.	Adulterated.	Total.
Bay Rum	—	1	1
Camphor	10	—	10
Camphorated Oil	24	3	27
Castor Oil	2	—	2
Hamamelis Water	12	12	24
Headache Powder	10	—	10
Lime Water	17	3	20
Magnesium Citrate	8	—	8
Mercury Ointment	20	4	24
Milk of Magnesia	3	2	5
Miscellaneous Drugs	20	—	20
Spirit of Camphor	38	6	44
Spirit of Nitrous Ether	101	28	129
Spirit of Peppermint	15	3	18
Sulphur	9	—	9
Tincture of Iodine	26	5	31
Tincture of Jamaica Ginger	33	16	49
Zinc Oxide	2	—	2
	350	83	433

TABLE 6. — *Liquor Report for Year from Dec. 1, 1923, to Dec. 1, 1924, for Towns having 10 or More Samples Analyzed.*

CITY OR TOWN.	Beer.	Cider.	Wine.	Distilled Spirits.	Flavoring Extracts.	Alcohol.	Miscellaneous.	Total.
Abington	4	—	6	6	—	—	—	16
Agawam	—	—	2	13	—	—	—	15
Athol	6	—	6	9	1	1	—	23
Beverly	8	2	7	10	—	4	—	31
Boston	163	1	97	1,639	6	340	61	2,307
Braintree	2	—	3	8	—	1	—	14
Brookfield	2	6	1	5	—	—	—	14
Brookline	—	—	1	23	—	2	1	27
Cambridge	20	17	28	343	17	60	9	494
Chelsea	8	—	1	10	—	2	—	21
Chicopee	8	—	1	1	—	—	—	10
Clinton	2	24	22	15	1	13	—	77
Dedham	1	—	4	20	—	—	1	26
Easton	—	10	1	4	—	—	—	15
Everett	2	—	4	36	—	1	—	43
Fall River	22	1	2	123	—	8	—	156
Fitchburg	25	3	2	15	—	7	—	52
Franklin	8	—	1	2	—	—	1	12
Gloucester	5	—	5	31	—	—	1	42
Haverhill	—	2	1	16	—	1	—	22
Holyoke	3	2	3	2	—	—	—	10
Hudson	6	—	8	5	8	5	—	32
Ipswich	1	3	2	4	—	1	—	11
Lawrence	72	—	6	88	1	36	6	209
Lee	1	1	7	2	—	—	4	15

TABLE 6. — *Liquor Report for Year from Dec. 1, 1923, to Dec. 1, 1924, for Towns having 10 or More Samples Analyzed — Concluded.*

CITY OR TOWN.	Beer.	Cider.	Wine.	Distilled Spirits.	Flavoring Extracts.	Alcohol.	Miscellaneous.	Total.
Leominster	11	—	7	5	—	8	—	31
Lowell	266	2	15	190	4	47	7	531
Lynn	44	1	21	146	1	56	18	287
Malden	18	1	12	165	—	27	—	223
Marlborough	61	2	20	23	—	—	3	110
Maynard	1	—	1	8	—	—	—	10
Melrose	—	—	—	9	—	1	1	11
Medford	1	—	21	80	—	10	—	112
Methuen	12	3	1	4	—	—	—	20
Milford	10	—	1	13	—	4	—	28
Monson	—	4	2	7	—	2	—	15
Newburyport	2	2	3	1	—	1	3	12
Newton	2	1	8	19	—	—	—	30
Norwood	4	4	1	24	—	1	—	34
Palmer	—	2	1	7	—	—	—	10
Peabody	4	—	1	19	—	7	3	34
Pittsfield	—	—	—	8	—	8	—	16
Quincy	3	—	12	12	2	14	—	43
Randolph	2	—	5	6	—	6	—	19
Reading	—	—	—	9	—	1	4	14
Revere	9	—	4	10	—	4	—	27
Rockland	5	—	—	7	—	—	1	13
Salem	17	1	7	95	6	63	4	193
Salisbury	19	2	1	2	—	2	—	26
Shirley	—	—	1	12	—	6	—	19
Somerville	37	—	16	95	—	14	—	162
Springfield	2	—	—	194	—	8	2	206
Stoughton	2	—	2	8	—	—	—	12
Swampscott	—	—	17	2	—	1	—	20
Taunton	10	—	3	7	—	2	—	22
Wakefield	2	5	18	49	—	2	—	76
Walpole	4	—	5	16	—	—	—	25
Waltham	7	—	4	10	1	18	1	41
Watertown	—	—	2	15	—	3	—	20
Westford	7	1	1	3	—	3	—	15
Wilmington	—	—	—	7	—	1	2	10
Woburn	1	—	3	11	—	1	1	17
Worcester	5	—	1	84	—	2	2	94
District Attorney	—	—	—	—	—	—	—	—
Mass. Board of Pharmacy	37	12	20	98	—	15	7	189
Dept. of Public Safety	21	4	6	41	—	5	6	83
Miscellaneous	44	25	42	90	3	36	5	245
	1,041	144	506	4,041	51	862	154	6,799

TABLE 7. — *Requests for Extension of Time granted on Goods in Cold Storage from December 1, 1923, to December 1, 1924.*

[Reason for such extension being that goods were in proper condition for further storage.]

ARTICLE.	Weight (Pounds).	Placed in Storage.	Extension granted to —	Name.
Eggs	2,500	June 26, 1923	Dec. 26, 1924	Keith, H. J., Co.
Eggs	13,200	June 1923 ¹	Sept. 30, 1924	Layton, John, Co., Inc.
Eggs	22,000	June 1923 ¹	Sept. 30, 1924	Layton, John, Co., Inc.
Eggs	150	June 16, 1923	July 29, 1924	Lewis, Mears Co.
Eggs	11,770	July 11, 1923	Oct. 11, 1924	Titman Egg Co.
Eggs	11,370	July 12, 1923	Oct. 12, 1924	Titman Egg Co.
Eggs	13,470	July 13, 1923	Oct. 13, 1924	Titman Egg Co.
Eggs	5,380	July 14, 1923	Oct. 14, 1924	Titman Egg Co.
Eggs	11,190	July 16, 1923	Oct. 16, 1924	Titman Egg Co.
Eggs	9,540	July 17, 1923	Oct. 17, 1924	Titman Egg Co.
Eggs	12,480	July 18, 1923	Oct. 18, 1924	Titman Egg Co.
Eggs	13,440	July 19, 1923	Oct. 19, 1924	Titman Egg Co.
Egg whites	1,496	June 1923 ¹	Sept. 30, 1924	Layton, John, Co., Inc.
Egg whites	2,200	June 1923 ¹	Sept. 30, 1924	Layton, John, Co., Inc.
Egg whites	24,000	June 1923 ¹	Sept. 30, 1924	Layton, John, Co., Inc.
Egg whites	450	June 16, 1923	July 16, 1924	Lewis, Mears Co.
Egg whites	14,250	June 16, 1923	Dec. 16, 1924	Lewis, Mears Co.
Egg whites	5,520	June 15, 1923	July 15, 1924	Titman Egg Co.
Egg yolks	5,145	Apr. 6, 1923	June 6, 1924	Goldsmith Stockwell Co.
Egg yolks	17,996	June 1923	Sept. 30, 1924	Layton, John, Co., Inc.
Egg yolks	24,000	June 1923	Sept. 30, 1924	Layton, John, Co., Inc.
Egg yolks	4,200	May 24, 1923	Oct. 24, 1924	Lewis, Mears Co.
Egg yolks	180	May 31, 1923	July 31, 1924	Lewis, Mears Co.
Butter	1,320	June 6, 1923	Aug. 6, 1924	Green & Co.
Butter	960	June 13, 1923	Aug. 13, 1924	Lewis, Mears Co.
Butter	378	July 19, 1923	Aug. 31, 1924	Massachusetts Department of Education.
Butter	378	July 19, 1923	Aug. 21, 1924	Massachusetts Department of Education.
Butter	617½	July 9, 1923	Jan. 9, 1925	Reed & Prince Manufacturing Co.
Chickens	1,048	Jan. 1, 1923	Feb. 12, 1924	The Fairmont Creamery Co.
Chickens	1,221	Jan. 1, 1923	Feb. 12, 1924	The Fairmont Creamery Co.

¹ Date of storage in China.

TABLE 7. — *Requests for Extension of Time granted on Goods in Cold Storage from December 1, 1923, to December 1, 1924 — Continued.*

ARTICLE.	Weight (Pounds).	Placed in Storage.	Extension granted to —	Name.
Chickens . . .	1,744	Jan. 1, 1923	Feb. 12, 1924	The Fairmont Creamery Co.
Chickens . . .	4,379	Jan. 1, 1923	Feb. 12, 1924	The Fairmont Creamery Co.
Chickens . . .	6,119	Jan. 1, 1923	Feb. 12, 1924	The Fairmont Creamery Co.
Chickens . . .	1,200	Jan. 2, 1923	Feb. 13, 1924	The Fairmont Creamery Co.
Chickens . . .	4,500	Jan. 2, 1923	Feb. 13, 1924	The Fairmont Creamery Co.
Chickens . . .	680	Jan. 3, 1923	Feb. 14, 1924	The Fairmont Creamery Co.
Chickens . . .	1,357	Jan. 4, 1923	Feb. 15, 1924	The Fairmont Creamery Co.
Chickens . . .	2,827	Jan. 4, 1923	Feb. 15, 1924	The Fairmont Creamery Co.
Chickens . . .	3,496	Jan. 5, 1923	Mar. 31, 1924	The Fairmont Creamery Co.
Chickens . . .	820	Jan. 9, 1923	Feb. 20, 1924	The Fairmont Creamery Co.
Chickens . . .	1,883	Jan. 9, 1923	Feb. 20, 1924	The Fairmont Creamery Co.
Chickens . . .	1,957	Jan. 16, 1923	Mar. 27, 1924	The Fairmont Creamery Co.
Chickens . . .	4,189	Jan. 16, 1923	Mar. 27, 1924	The Fairmont Creamery Co.
Chickens . . .	3,126	Jan. 19, 1923	Apr. 1, 1924	The Fairmont Creamery Co.
Chickens . . .	538	Jan. 23, 1923	Mar. 4, 1924	The Fairmont Creamery Co.
Chickens . . .	1,199	Jan. 23, 1923	Apr. 4, 1924	The Fairmont Creamery Co.
Chickens . . .	1,216	Jan. 23, 1923	Mar. 4, 1924	The Fairmont Creamery Co.
Chickens . . .	1,507	Jan. 23, 1923	Apr. 4, 1924	The Fairmont Creamery Co.
Poultry . . .	4,541	—	Mar. 30, 1925	Dorr, Arthur E., & Co., Inc.
Poultry . . .	26,254	—	Mar. 30, 1925	Dorr, Arthur E., & Co., Inc.
Poultry . . .	1,838	Feb. 19, 1923	Apr. 5, 1924	The Fairmont Creamery Co.
Turkeys . . .	624	Mar. 12, 1923	Apr. 30, 1924	Eastman, Frank B.
Turkeys . . .	200	June 19, 1923	July 30, 1924	Eastman, Frank B.
Turkeys . . .	5,775	Dec. 26, 1922	Feb. 1, 1924	Hosmer, F. H., & Co.
Turkeys . . .	1,201	Jan. 4, 1923	Mar. 4, 1924	Hosmer, F. H., & Co.
Turkeys . . .	1,899	Jan. 8, 1923	Mar. 8, 1924	Hosmer, F. H., & Co.
Turkeys . . .	2,109	Jan. 8, 1923	Mar. 8, 1924	Hosmer, F. H., & Co.
Turkeys . . .	1,443	Jan. 9, 1923	Mar. 9, 1924	Hosmer, F. H., & Co.
Turkeys . . .	1,672	Jan. 9, 1923	Mar. 9, 1924	Hosmer, F. H., & Co.
Turkeys . . .	1,750	Jan. 9, 1923	Mar. 9, 1924	Hosmer, F. H., & Co.
Turkeys . . .	947	Jan. 15, 1923	Mar. 15, 1924	Hosmer, F. H., & Co.
Turkeys . . .	1,244	Jan. 15, 1923	Mar. 15, 1924	Hosmer, F. H., & Co.
Turkeys . . .	1,931	Jan. 15, 1923	Mar. 15, 1924	Hosmer, F. H., & Co.
Turkeys . . .	718	Jan. 6, 1923	Feb. 17, 1924	Lamson & Co.
Turkeys . . .	731	Jan. 16, 1923	Feb. 28, 1924	Lamson & Co.
Turkeys . . .	570	Dec. 26, 1923	Feb. 1, 1924	Lamson & Co.
Turkeys . . .	6,913	Dec. 30, 1922	Apr. 19, 1924	Lamson & Co.
Turkeys . . .	1,500	Jan. 5, 1923	Feb. 1, 1924	Lamson & Co.
Ducks . . .	1,410	Mar. 5, 1923	May 5, 1924	Eastman, Frank B.
Geese . . .	1,164	Jan. 9, 1923	May 9, 1924	Eastman, Frank B.
Venison . . .	210	Nov. 21, 1922	Jan. 31, 1924	Armstrong, David B.
Venison . . .	80	Dec. 8, 1922	Jan. 15, 1924	Berry, Charles, Dr.
Venison . . .	76	Nov. 7, 1923	Jan. 7, 1925	Keating, John J.
Venison . . .	30	Nov. 14, 1923	Apr. 1, 1925	Thompson, Albert W.
Beef . . .	2,796	Nov. 9, 1923	Dec. 9, 1924	Hark, Harry.
Beef . . .	4,149	Nov. 9, 1923	Dec. 9, 1924	Hark, Harry.
Beef . . .	1,065	Nov. 21, 1923	Dec. 21, 1924	Hark, Harry.
Beef . . .	3,355	Nov. 21, 1923	Dec. 21, 1924	Hark, Harry.
Beef . . .	3,740	Nov. 23, 1923	Dec. 23, 1924	Hark, Harry.
Beef . . .	1,217	Nov. 28, 1923	Dec. 28, 1924	Hark, Harry.
Beef ribs . . .	1,363	Mar. 30, 1923	Apr. 30, 1924	Swift & Co.
Beef ribs . . .	2,340	Mar. 22, 1923	Apr. 22, 1924	Swift & Co.
Beef sirloins . . .	202	—	Dec. 1, 1924	Dustin, A. J.
Beef sirloins . . .	720	—	Dec. 1, 1924	Dustin, A. J.
Beef sirloins . . .	786	—	Dec. 1, 1924	Dustin, A. J.
Beef sirloins . . .	393	July 21, 1923	Nov. 1, 1924	Skinner, George E., Co.
Beef sirloins . . .	1,336	Mar. 3, 1923	Apr. 3, 1924	Swift & Co.
Beef sirloins . . .	3,510	Mar. 22, 1923	Apr. 22, 1924	Swift & Co.
Beef sirloins . . .	1,691	Mar. 30, 1923	Apr. 30, 1924	Swift & Co.
Beef sirloins . . .	2,624	Nov. 1923	Dec. 31, 1924	Wheeler, T. H., Co.
Beef sirloins . . .	6,519	Nov. 1923	Dec. 31, 1924	Wheeler, T. H., Co.
Pork butts . . .	7,150	Dec. 27, 1923	Jan. 27, 1924	Joyce, William G.
Pork butts . . .	7,305	Dec. 29, 1923	Jan. 29, 1924	Joyce, William G.
Pork butts . . .	2,500	Jan. 4, 1923	Feb. 4, 1924	Joyce, William G.
Pork butts . . .	3,217	Jan. 24, 1923	Feb. 24, 1924	Joyce, William G.
Pork loins . . .	7,500	Jan. 5, 1923	Mar. 5, 1924	Anderson, John E.
Pork loins . . .	1,100	Jan. 4, 1923	Feb. 4, 1924	Fairburn, George
Pork loins . . .	10,244	Nov. 6, 1922	Feb. 29, 1924	Batchelder & Snyder Co.
Pork loins . . .	3,331	Dec. 2, 1922	Feb. 15, 1924	Batchelder & Snyder Co.
Pork loins . . .	3,227	Dec. 6, 1922	Feb. 15, 1924	Batchelder & Snyder Co.
Pork loins . . .	11,032	Dec. 6, 1922	Feb. 15, 1924	Batchelder & Snyder Co.
Pork loins . . .	15,510	Dec. 7, 1922	Feb. 29, 1924	Batchelder & Snyder Co.
Pork loins . . .	9,749	Dec. 8, 1922	Feb. 15, 1924	Batchelder & Snyder Co.
Pork loins . . .	10,170	Dec. 8, 1922	Feb. 15, 1924	Batchelder & Snyder Co.
Pork loins . . .	5,261	Dec. 11, 1922	Feb. 15, 1924	Batchelder & Snyder Co.
Pork loins . . .	5,386	Dec. 13, 1922	Feb. 15, 1924	Batchelder & Snyder Co.
Pork loins . . .	13,655	Dec. 13, 1922	Feb. 15, 1924	Batchelder & Snyder Co.
Pork loins . . .	3,976	Dec. 21, 1922	Feb. 15, 1924	Batchelder & Snyder Co.
Pork loins . . .	2,216	Dec. 19, 1923	Jan. 19, 1924	Berry-Wales Co.
Pork loins . . .	10,335	Dec. 13, 1922	Mar. 1, 1924	Cobb, Arthur L.
Pork loins . . .	3,700	Dec. 16, 1922	Mar. 1, 1924	Cobb, Arthur L.

¹ Original date of storage unknown.² Original date of storage unknown, imported.

TABLE 7. — *Requests for Extension of Time granted on Goods in Cold Storage from December 1, 1923, to December 1, 1924 — Continued.*

ARTICLE.	Weight (Pounds).	Placed in Storage.	Extension granted to —	Name.
Pork loins . . .	5,726	Dec. 16, 1922	Mar. 1, 1924	Cobb, Arthur L.
Pork loins . . .	25,500	Jan. 6, 1923	Mar. 6, 1924	Cobb, Arthur L.
Pork loins . . .	8,520	Feb. 1, 1923	Mar. 15, 1924	Cobb, Arthur L.
Pork loins . . .	12,210	Feb. 1, 1923	Mar. 15, 1924	Cobb, Arthur L.
Pork loins . . .	1,100	Jan. 4, 1923	Feb. 4, 1924	Fairburn, George.
Pork loins . . .	8,050	Dec. 21, 1922	Feb. 29, 1924	Faneuil Beef Co.
Pork loins . . .	9,770	Dec. 21, 1922	Feb. 15, 1924	Faneuil Beef Co.
Pork loins . . .	6,209	Jan. 11, 1923	Mar. 11, 1924	Whitaker, C. F.
Pork loins . . .	773	Jan. 10, 1923	Mar. 10, 1924	Yunus, K.
Pork loins . . .	5,427	Jan. 10, 1923	Mar. 10, 1924	Yunus, K.
Pork shoulders . . .	1,986	Dec. 2, 1922	Feb. 1, 1924	Wilson & Co.
Pork shoulders . . .	2,808	Dec. 2, 1922	Feb. 1, 1924	Wilson & Co.
Veal fores . . .	126	Aug. 30, 1923	Oct. 20, 1924	Skinner, George E., Co.
Veal fores . . .	901	Aug. 31, 1923	Oct. 20, 1924	Skinner, George E., Co.
Veal legs . . .	3,000	Nov. 23, 1923	Mar. 13, 1925	Dorr, Arthur E., & Co., Inc.
Veal sides . . .	2,557	Nov. 13, 1923	Mar. 13, 1925	Dorr, Arthur E., & Co., Inc.
Veal sides . . .	6,875	Nov. 15, 1923	Mar. 13, 1925	Dorr, Arthur E., & Co., Inc.
Ciscoes . . .	24,000	—	Jan. 31, 1925	New England Smoked Fish Co.
Eels, sand . . .	3,500	May 7, 1923	Dec. 31, 1924	Busalacchi Brothers.
Eels, sand . . .	2,000	May 12, 1923	Dec. 31, 1924	Busalacchi Brothers.
Eels, sand . . .	8,951	Sept. 5, 1923	Dec. 31, 1924	Busalacchi Brothers.
Eels, sand . . .	4,370	Sept. 14, 1923	Dec. 31, 1924	Busalacchi Brothers.
Eels, sand . . .	4,000	Oct. 5, 1923	Dec. 31, 1924	Busalacchi Brothers.
Eels, sand . . .	1,914	—	Dec. 18, 1924	Corso & Cannizzo.
Haddock . . .	710	Aug. 24, 1923	Jan. 1, 1925	Batchelder & Snyder Co.
Haddock . . .	830	Aug. 31, 1923	Jan. 1, 1925	Batchelder & Snyder Co.
Haddock . . .	1,150	Sept. 7, 1923	Jan. 1, 1925	Batchelder & Snyder Co.
Halibut . . .	1,342	Sept. 30, 1923	Nov. 30, 1924	Arnold & Winsor Co.
Halibut . . .	5,400	July 5, 1923	Sept. 5, 1924	Atlantic Halibut Co.
Halibut . . .	9,900	July 5, 1923	Sept. 5, 1924	Atlantic Halibut Co.
Halibut . . .	19,800	July 5, 1923	Sept. 5, 1924	Atlantic Halibut Co.
Halibut . . .	12,168	Sept. 5, 1923	Mar. 5, 1925	Atlantic Halibut Co.
Halibut . . .	14,301	Sept. 5, 1923	Mar. 5, 1925	Atlantic Halibut Co.
Halibut . . .	16,875	Sept. 5, 1923	Mar. 5, 1925	Atlantic Halibut Co.
Halibut . . .	300	June 15, 1923	Dec. 15, 1924	Baker, A. G., Inc.
Halibut . . .	300	Aug. 1, 1923	Jan. 11, 1925	Baker, A. G., Inc.
Halibut . . .	4,805	Aug. 1, 1923	Jan. 1, 1925	Baker, A. G., Inc.
Halibut . . .	185	Aug. 25, 1923	Jan. 25, 1925	Baker, A. G., Inc.
Halibut . . .	1,460	Aug. 25, 1923	Jan. 25, 1925	Baker, A. G., Inc.
Halibut . . .	75	Sept. 8, 1923	Jan. 8, 1925	Baker, A. G., Inc.
Halibut . . .	255	Oct. 6, 1923	Jan. 6, 1925	Baker, A. G., Inc.
Halibut . . .	265	Oct. 13, 1923	Jan. 13, 1925	Baker, A. G., Inc.
Halibut . . .	6,206	Aug. 16, 1923	Jan. 1, 1925	Batchelder & Snyder Co.
Halibut . . .	1,421	Sept. 1, 1923	Jan. 1, 1925	Booth Fisheries Co.
Halibut . . .	1,864	Sept. 1, 1923	Jan. 1, 1925	Booth Fisheries Co.
Halibut . . .	2,400	Aug. 16, 1923	Jan. 1, 1925	Coleman Sons Co.
Halibut . . .	2,550	June 17, 1923	Dec. 31, 1924	Dorr, Arthur E., & Co., Inc.
Halibut . . .	950	Nov. 5, 1923	Dec. 31, 1924	Dorr, Arthur E., & Co., Inc.
Halibut . . .	1,588	Aug. 1, 1923	Jan. 1, 1925	Goodspeed, L. B.
Halibut . . .	332	Sept. 30, 1923	Dec. 30, 1924	Harding, F. E., & Co.
Halibut . . .	1,321	Aug. 1, 1923	Jan. 1, 1925	Henry & Close Co.
Halibut . . .	1,509	Aug. 1, 1923	Jan. 1, 1925	Henry & Close Co.
Halibut . . .	10,104	Aug. 1, 1923	Jan. 1, 1925	Henry & Close Co.
Halibut . . .	6,596	Dec. 5, 1923	Jan. 30, 1925	Henry & Close Co.
Halibut . . .	2,669	Aug. 1, 1923	Feb. 1, 1925	New England Fish Co.
Halibut . . .	8,200	Aug. 1, 1923	Feb. 1, 1925	New England Fish Co.
Halibut . . .	14,064	Aug. 1, 1923	Feb. 1, 1925	New England Fish Co.
Halibut . . .	14,379	Aug. 1, 1923	Feb. 1, 1925	New England Fish Co.
Halibut . . .	15,739	Aug. 1, 1923	Feb. 1, 1925	New England Fish Co.
Halibut . . .	4,712	Sept. 30, 1923	Jan. 31, 1925	New England Fish Co.
Halibut . . .	20,112	Sept. 30, 1923	Jan. 31, 1925	New England Fish Co.
Halibut . . .	1,288	Aug. 6, 1923	Jan. 6, 1925	Rich, Joseph A., Co.
Halibut . . .	5,799	Aug. 6, 1923	Jan. 6, 1925	Rich, Joseph A., Co.
Halibut . . .	1,649	Sept. 1, 1923	Feb. 25, 1925	Rich, Joseph A., Co.
Halibut . . .	2,786	Sept. 1, 1923	Feb. 25, 1925	Rich, Joseph A., Co.
Halibut . . .	5,091	Sept. 1, 1923	Feb. 25, 1925	Rich, Joseph A., Co.
Halibut . . .	5,773	Sept. 1, 1923	Feb. 25, 1925	Rich, Joseph A., Co.
Halibut . . .	9,840	Sept. 1, 1923	Feb. 25, 1925	Rich, Joseph A., Co.
Halibut . . .	10,050	Sept. 1, 1923	Feb. 25, 1925	Rich, Joseph A., Co.
Herring . . .	1,000	Sept. 4, 1923	Jan. 4, 1925	Baker, A. G., Inc.
Herring . . .	8,200	June 7, 1923	Dec. 31, 1924	Dorr, Arthur E., & Co., Inc.
Herring ² . . .	600	—	Feb. 7, 1925	Warren Fitch Co.
Herring, sardine . . .	4,375	Nov. 3, 1923	Jan. 31, 1925	Busalacchi Brothers.
Herring, sardine . . .	7,200	Nov. 9, 1923	Jan. 31, 1925	Busalacchi Brothers.
Mackerel . . .	100	Aug. 18, 1923	Dec. 18, 1925	Baker, A. G., Inc.
Mackerel . . .	400	Aug. 25, 1923	Jan. 25, 1925	Baker, A. G., Inc.
Mackerel . . .	500	Sept. 10, 1923	Jan. 10, 1925	Baker, A. G., Inc.
Mackerel . . .	180	Sept. 19, 1923	Jan. 28, 1925	Baker, A. G., Inc.
Mackerel . . .	2,500	Sept. 19, 1923	Jan. 19, 1925	Baker, A. G., Inc.
Mackerel . . .	185	Oct. 6, 1923	Nov. 6, 1924	Baker, A. G., Inc.

¹ Original date of storage unknown.² Bait.

TABLE 7. — *Requests for Extension of Time granted on Goods in Cold Storage from December 1, 1923, to December 1, 1924 — Concluded.*

ARTICLE.	Weight (Pounds).	Placed in Storage.	Extension granted to —	Name.
Mackerel . . .	2,150	Sept. 29, 1923	Nov. 29, 1924	Banks Fish Market.
Mackerel . . .	7,107	Aug. 20, 1923	Jan. 1, 1925	Batchelder & Snyder Co.
Mackerel . . .	5,000	Aug. 25, 1923	Dec. 26, 1924	Booth Fisheries Co.
Mackerel . . .	1,060	Sept. 25, 1923	Jan. 1, 1925	Booth Fisheries Co.
Mackerel . . .	1,028	Aug. 21, 1923	Dec. 31, 1924	Brockton Public Market.
Mackerel . . .	1,300	Sept. 12, 1923	Dec. 12, 1924	Chestro, John.
Mackerel . . .	1,000	Sept. 11, 1923	Dec. 31, 1924	Commonwealth Ice & Cold Storage Co.
Mackerel . . .	718	Sept. 14, 1923	Dec. 14, 1924	Commonwealth Ice & Cold Storage Co.
Mackerel . . .	360	Sept. 19, 1923	Dec. 18, 1924	Corso & Cannizzo.
Mackerel . . .	809	Aug. 17, 1923	Dec. 31, 1924	Dorr, Arthur E., & Co., Inc.
Mackerel . . .	1,400	July 7, 1923	Sept. 7, 1924	Foley, M. F., Co.
Mackerel . . .	920	July 9, 1923	Sept. 9, 1924	Foley, M. F., Co.
Mackerel . . .	7,560	Aug. 8, 1923	Oct. 8, 1924	Foley, M. F., Co.
Mackerel . . .	3,235	June 26, 1923	Dec. 26, 1924	Henry & Close.
Mackerel . . .	800	Sept. 25, 1923	Nov. 30, 1924	Lake Erie Fish Co.
Mackerel . . .	10,799	Aug. 20, 1923	Dec. 20, 1924	Nagle, John, & Co.
Mackerel . . .	2,340	Oct. 25, 1923	Dec. 1, 1924	Ocean Fish Co.
Mackerel ¹ . . .	8,432	June 6, 1923	Jan. 1, 1925	Rowe & Sullivan.
Mackerel . . .	9,151	July 25, 1923	Jan. 1, 1925	Rowe & Sullivan.
Mackerel . . .	1,070	Aug. 7, 1923	Feb. 7, 1925	Warren Fitch Co.
Mackerel . . .	875	Sept. 11, 1923	Oct. 11, 1924	White Fish Market.
Salmon . . .	712	— ²	Dec. 28, 1924	Atlas Fish Co.
Salmon . . .	600	Aug. 17, 1923	Dec. 31, 1924	Dorr, Arthur E., & Co., Inc.
Salmon . . .	675	July 12, 1923	Sept. 12, 1924	Whitman, Ward & Lee.
Scup . . .	630	July 7, 1923	Dec. 7, 1924	Corso & Cannizzo.
Scup . . .	2,800	June 27, 1923	Dec. 27, 1924	Seaconnet River Fishing Co.
Smelts . . .	310	—	Dec. 31, 1924	Busalacchi Brothers.
Smelts . . .	200	Apr. 29, 1924	Dec. 15, 1924	Prime Fish Co.
Smelts . . .	500	Apr. 29, 1924	Dec. 15, 1924	Prime Fish Co.
Smelts . . .	1,400	Apr. 29, 1924	Dec. 15, 1924	Prime Fish Co.
Sole ¹ . . .	2,800	June 5, 1923	Dec. 31, 1924	Gifford, C. H.
Sole ¹ . . .	3,100	June 21, 1923	Dec. 31, 1924	Gifford, C. H.
Sole ¹ . . .	600	July 13, 1923	Dec. 31, 1924	Gifford, C. H.
Sole ¹ . . .	900	July 23, 1923	Dec. 31, 1924	Gifford, C. H.
Sole ¹ . . .	1,700	Aug. 13, 1923	Dec. 31, 1924	Gifford, C. H.
Sole ¹ . . .	4,500	Aug. 13, 1923	Dec. 31, 1924	Gifford, C. H.
Sworfish . . .	1,420	June 19, 1923	Dec. 31, 1924	Dorr, Arthur E., & Co., Inc.
Whiting . . .	175	Aug. 17, 1923	Dec. 20, 1924	Corso & Cannizzo.
Whiting . . .	1,028	Aug. 17, 1923	Dec. 20, 1924	Corso & Cannizzo.

TABLE 8. — *Requests for Extension of Time not granted on Goods in Cold Storage from December 1, 1923, to December 1, 1924.*

ARTICLE.	Weight (Pounds).	Placed in Storage.	Name.
Chickens . . .	4,600	Jan. 22, 1923	Wheeler, T. H., Co.
Beef ribs . . .	514	Feb. 1, 1923	Swift & Co.
Beef ribs . . .	74	Feb. 3, 1923	Swift & Co.
Beef ribs . . .	828	Feb. 27, 1923	Swift & Co.
Beef ribs . . .	1,943	Feb. 27, 1923	Swift & Co.
Beef sirloins . . .	1,737	Feb. 3, 1923	Swift & Co.
Beef sirloins . . .	1,321	Feb. 13, 1923	Swift & Co.
Beef sirloins . . .	606	Feb. 14, 1923	Swift & Co.
Beef sirloins . . .	591	Feb. 16, 1923	Swift & Co.
Beef sirloins . . .	1,150	Feb. 17, 1923	Swift & Co.
Beef sirloins . . .	70	Feb. 23, 1923	Swift & Co.
Beef sirloins . . .	2,226	Feb. 27, 1923	Swift & Co.
Pork butts . . .	3,711	Jan. 19, 1923	Hawkins, L. T.
Pork loins . . .	2,736	Mar. 28, 1923	Caron's Market.
Pork loins . . .	21,830	Nov. 19, 1922	Alexander, Joseph.
Pork loins . . .	6,000	Oct. 25, 1923	Poole, J. R., Co.
Pork shoulders . . .	743	Mar. 14, 1923	Moore, Alexander.
Pork sausages . . .	1,650	Jan. 12, 1923	Collins Packing Co.
Pork sausages . . .	125	Jan. 15, 1923	Collins Packing Co.
Pork sausages . . .	775	Jan. 25, 1923	Collins Packing Co.
Pork sausages . . .	1,375	Jan. 20, 1923	Collins Packing Co.
Venison . . .	26	Nov. 9, 1922	Maynard, Ernest F.
Halibut . . .	300	June 15, 1923	Dorr, Arthur E., & Co., Inc.
Halibut . . .	600	June 15, 1923	Dorr, Arthur E., & Co., Inc.
Mackerel . . .	3,150	Sept. 10, 1923	National Fish Co.
Mackerel . . .	1,800	Sept. 11, 1923	National Fish Co.
Mackerel . . .	330	Sept. 12, 1923	National Fish Co.

¹ Bait.² Original date of storage unknown.

TABLE 9. — *Articles which had been in Cold Storage longer than Twelve Months, and on which no Requests for Extensions had been made, ordered removed from December 1, 1923, to December 1, 1924.*

ARTICLE.	Weight (Pounds).	Placed in Storage.	Name.
Butter	60	July 18, 1923	Dunkel, R.
Chickens	140	Nov. 10, 1922	Gordon, Walter.
Chickens	121	Apr. 9, 1923	Harvard Provision Co.
Chickens	540	Dec. 1922	Hosmer, F. H., Co.
Chickens	1,240	Dec. 1922	Hosmer, F. H., Co.
Chickens	4,158	Nov. 20, 1922	Weiss, Norman M.
Chickens	10,170	Nov. 20, 1922	Weiss, Norman M.
Chickens	12,133	Nov. 27, 1922	Weiss, Norman M.
Poultry	860	June 22, 1923	Littlefield, J. F.
Poultry	160	Jan. 20, 1923	Osgood, C. H.
Poultry	43	Feb. 8, 1923	Robbins, Nathan, Co.
Poultry	60	Dec. 5, 1922	Voci, G.
Turkeys	902	Dec. 1922	Highland Hotel.
Turkeys	720	Feb. 9, 1923	Jarpe Commission Co.
Turkeys	1,150	Feb. 9, 1923	Jarpe Commission Co.
Turkeys	1,175	Feb. 9, 1923	Jarpe Commission Co.
Turkeys	96	Jan. 22, 1923	Marston & Sturtevant.
Turkeys	739	Jan. 6, 1923	Quinn, P. T.
Moose	90	Nov. 6, 1922	Latieg, N.
Pheasants	10	Nov. 6, 1922	Swift, E. K.
Rabbits	20	Nov. 4, 1922	Fay, H. J. W.
Venison	5	Oct. 6, 1923	Dunham, Dr.
Venison	230	Nov. 23, 1922	Gregory, F. E.
Venison	26	Nov. 9, 1922	Maynard, Ernest.
Venison	75	Jan. 10, 1923	Rounds, George E.
Beef	320	Aug. 9, 1923	Caron's Market.
Beef	104	Feb. 23, 1923	Cordes, Joseph.
Beef	79	June 15, 1923	Doe, William A., Co.
Beef	170	Apr. 17, 1923	Kadish, Nathan.
Beef kidneys	300	Sept. 28, 1923	Hawkins, L. T.
Beef kidneys	225	Oct. 15, 1923	Hawkins, L. T.
Beef livers	840	Feb. 23, 1923	Epstein, H.
Beef livers	150	Sept. 13, 1923	Star Beef Co.
Beef livers	182	Feb. 28, 1923	The Original Squire.
Beef loins	350	Apr. 11, 1923	Doe, William A., Co.
Beef ribs	124	Sept. 22, 1923	Glennie, A.
Lamb fores	150	July 25, 1923	Industrial School for Girls.
Pork	300	Mar. 23, 1923	Brown, F. W.
Pork	38	June 4, 1923	Holmes, Samuel.
Pork	200	Mar. 19, 1923	O'Brien, C.
Pork	50	May 31, 1923	Towle & Hilliard.
Pork	208	Mar. 3, 1923	Yannis, A.
Pork	1,244	Mar. 3, 1923	Yannis, A.
Pork kidneys	593	Sept. 28, 1923	Hawkins, L. T.
Pork loins	20,253	Jan. 23, 1923	Handy, H. L., Co.
Veal	140	Apr. 18, 1923	Glennie, A.
Veal	50	Dec. 6, 1922	Norman Beef Co.
Veal legs	390	Aug. 13, 1923	The Original Squire.
Eels	1,376	July 13, 1923	Mantia, John.
Eels	1,590	June 22, 1923	Mantia, S., & Co.
Eels, sand	2,000	July 14, 1923	Mantia, S., & Co.
Haddock	950	Oct. 19, 1923	Batchelder & Snyder Co.
Halibut	1,100	Nov. 19, 1923	Russo & Sons.
Mackerel	154	June 21, 1923	Di Prima, A.
Mackerel	200	Sept. 11, 1923	Kohler Brothers.
Mackerel	325	Aug. 17, 1923	Papalardo Brothers.
Mackerel	3,600	June 21, 1923	Prime Fish Co.
Salmon	3,000	Oct. 6, 1923	Whitman, Ward & Lee.
Scallops	40	Dec. 21, 1922	Poole, J. R., Co.
Whiting	6,375	July 14, 1923	Mantia, G.
Whiting	844	July 1923	Mantia, S., & Co.

TABLE 10. — *Articles Other than Fish placed in Cold Storage from December 1, 1923, to December 1, 1924.*

	Butter (Pounds).	Eggs (Dozens).	Broken- out Eggs (Pounds).	Broilers (Pounds).	Roasters (Pounds).	Fowls (Pounds).	Turkeys (Pounds).	Miscel- laneous Poultry (Pounds).	Beef (Pounds).	Pork (Pounds).	Lamb and Mutton (Pounds).	Miscel- laneous Meats (Pounds).
December					1,004,507	745,122	821,269	721,657	627,438	4,722,395	192,379	1,385,887
January	1,115,338	390,090	155,925	70,561	939,522	372,049	1,008,520	243,550	505,267	3,761,412	74,761	1,054,881
February	776,366	374,610	150,150	90,992	348,358	525,166	636,744	183,805	311,936	2,163,350	32,313	831,778
March	755,419	253,590	118,677	97,445	193,844	335,307	188,344	181,186	329,701	1,357,157	14,195	1,008,400
April	546,050	572,880	98,488	68,106	285,929	35,437	66,534	71,704	435,697	1,573,076	134,297	1,039,081
May	512,177	4,830,750	456,010	64,646	284,339	198,449	95,438	192,520	745,848	1,582,990	180,264	706,661
June	2,452,842	6,866,460	494,745	69,002	284,339	198,449	95,438	192,520	745,848	1,582,990	180,264	706,661
July	10,754,970	4,068,630	173,344	89,080	258,075	812,697	117,449	186,662	776,804	2,305,384	310,396	1,100,961
August	11,307,977	2,226,630	258,074	50,612	563,978	751,660	52,176	161,087	527,093	2,723,148	85,102	1,302,623
September	5,118,129	911,700	261,733	114,809	210,725	153,750	24,304	80,906	650,325	939,202	73,169	850,923
October	2,803,669	765,270	241,702	935,362	164,047	148,733	7,767	109,107	288,958	1,115,569	93,535	822,275
November	1,682,309	568,890	307,052	298,403	627,485	144,237	14,174	401,495½	371,052	1,558,090	104,577	689,462
	1,390,087	323,460	296,975	110,526	1,390,629	162,469	862,367	818,551	910,874	1,344,392	118,111	1,103,992

TABLE 10. — *Fish placed in Cold Storage from December 15, 1923, to December 15, 1924.*

	Bluefish (Pounds).	Butter- fish, (Pounds).	Giscos (Pounds).	Cod, Hake, Pollock and Haddock (Pounds).	Halibut (Pounds).	Herring (Pounds).	Mackerel (Pounds).	Fall and Silver Salmon (Pounds).	Salmon, all Other (Pounds).	Shad (Pounds).	Smelts, Eulachon, etc. (Pounds).	Squid (Pounds).	Whitefish (Pounds).	Whiting (Pounds).	Miscel- laneous Frozen Fish (Pounds).
December			92,126	12,640	347,848	189,365	310,686	87,749	94,076	115	66,522	38,867	90	9,690	201,556
January		3,547	40,000	14,759	104,101	446,733	266,111	3,162	61,675	3,687	161,056	92,824		9,835	105,448
February	522	170	7,100	21,544	61,975	1,093,155	37,843	41,566	29,547	900	334,401	149,324		49,580	79,910
March			1,744	68,570	538,623	64,315	20,316	40,001	52,057		5,184	93,261			78,272
April		584	564	12,319	164,690	1,366,349	3,528	1,181	44,309	33,436	6,146	78,428			64,610
May		3,450	2,550	7,014	22,026	1,177,778	148,881	2,919	74,717	2,930	1,630	1,193,256		38,800	98,667
June		76,374		33,834	126,470	511,311	193,424	12,571	190,334	39,479	130	228,202	370	612,610	337,894
July		10,480	1,100	63,801	214,510	277,986	1,129,302	6,523	104,476	31,400	130	70,966	935	1,850,748	604,428
August		6,841		85,290	27,190	327,304	1,013,397	16,872	30,565		250	156,939		562,430	186,069
September		1,496		85,290	49,234	1,130,484	58,556	114,801	59,348		1,780	499,562		104,985	242,111
October		8,892	300	90,709	173,706	1,010,678	270,735	402,474	43,617		780	127,127	1,553	147,620	161,809
November		545	5,080	105,928	102,293	839,550	318,591	101,355	25,745		17,717	39,192	1,470	86,437	188,154

TABLE 11. — *Articles Other than Fish on Hand in Cold Storage on the First Day of the Month, from January 1, 1923, through December 1, 1924.*

	Butter (Pounds).	Eggs (Dozens).	Broken-out Eggs (Pounds).	Broilers (Pounds).	Roasters (Pounds).	Fowls (Pounds).	Turkeys (Pounds).	Miscellaneous Poultry (Pounds).	Beef (Pounds).	Pork (Pounds).	Lamb and Mutton (Pounds).	Miscellaneous Meats (Pounds).
January	5,814,678	4,986,150	1,347,987	683,248	2,886,593	1,258,332	664,058	1,585,352	2,239,008	7,668,158	522,503	2,565,904
February	2,927,316	2,053,950	1,194,842	679,598	3,465,486	1,292,587	1,411,751	1,631,288	2,168,593	9,527,441	474,295	2,435,634
March	1,824,591	199,350	1,044,434	682,238	3,248,788	1,549,261	1,759,730	1,555,593	1,941,855	10,999,961	446,486	2,308,930
April	998,777	421,110	837,248	643,756	2,489,167	1,585,148	1,621,468	1,312,169	1,770,549	11,430,574	348,339	2,435,814
May	701,637	5,415,900	1,042,812	564,629	1,644,972	1,069,020	1,351,867	962,513	1,628,969	10,726,991	378,266	2,231,597
June	2,563,877	11,010,790	1,302,548	517,657	755,256	806,954	1,159,674	302,398	1,848,390	9,524,685	488,098	1,938,732
July	11,990,170	16,670,080	1,207,344	497,675	328,138	1,454,236	1,068,541	804,527	2,020,302	10,250,749	632,222	2,105,140
August	21,905,263	15,800,280	1,187,341	478,407	298,698	1,996,459	709,046	467,695	1,794,688	9,977,434	523,493	2,250,269
September	24,848,495	14,796,210	1,070,962	559,612	151,022	1,699,140	411,020	278,847	1,537,278	8,102,372	444,724	2,195,717
October	25,050,228	12,893,370	1,010,765	1,092,402	173,158	1,330,068	202,103	304,166	1,354,038	5,139,328	477,373	2,030,838
November	22,287,570	9,449,040	954,905	1,223,795	739,614	1,095,573	117,697	557,182	1,285,590	2,396,073	540,935	1,462,089
December	18,400,944	6,586,080	849,600	1,195,280	2,094,447	1,025,970	803,715	1,244,543	1,920,549	2,757,589	620,525	1,806,305

TABLE 11. — *Fish on Hand in Cold Storage on the Fifteenth Day of the Month, from January 15, 1923, through December 15, 1924.*

	Bluefish (Pounds).	Butterfish (Pounds).	Ciscoes (Pounds).	Cod, Hake, Pollock and Haddock (Pounds).	Halibut (Pounds).	Herring (Pounds).	Mackerel (Pounds).	Fall and Silver Salmon (Pounds).	Salmon, all Other (Pounds).	Shad (Pounds).	Smelts, Eulachon, etc. (Pounds).	Squid (Pounds).	Whitefish (Pounds).	Whiting (Pounds).	Miscellaneous Frozen Fish (Pounds).
January	—	44,256	127,351	292,517	753,861	1,087,987	1,903,763	146,154	220,674	10,977	62,280	361,418	36,596	2,807,924	828,290
February	351	22,164	88,015	199,677	625,484	511,097	1,449,419	75,728	201,962	11,939	195,229	216,993	25,354	1,399,135	534,435
March	351	9,229	48,039	132,168	437,959	791,871	804,242	71,336	155,186	5,101	454,975	120,733	15,255	394,041	394,305
April	351	1,920	29,455	43,897	801,472	1,90,372	2,86,387	72,528	123,811	4,041	225,294	8,651	880	59,592	197,625
May	351	1,768	25,371	11,227	879,747	1,090,428	140,193	16,871	119,982	5,527	101,719	77,064	—	31,828	176,011
June	351	4,734	24,161	16,232	878,118	1,977,119	193,076	14,604	133,704	5,128	92,163	1,270,147	—	47,572	238,390
July	—	80,708	23,831	35,778	954,615	2,244,583	989,126	19,701	213,670	43,784	89,552	1,440,891	—	587,247	475,645
August	—	89,766	24,931	71,367	1,117,715	2,203,584	2,156,611	16,140	195,476	74,964	87,989	1,419,759	935	2,182,485	907,787
September	—	96,248	24,931	95,204	1,292,542	1,736,338	3,061,947	18,691	195,854	63,079	86,446	1,459,173	935	2,468,600	924,332
October	—	96,942	24,934	158,434	1,293,758	2,974,377	2,974,377	101,254	213,760	51,649	81,018	1,827,239	935	2,115,249	1,911,830
November	—	52,832	24,934	231,303	1,068,849	2,515,770	2,862,916	461,491	242,652	51,385	73,374	1,767,289	2,488	1,636,822	1,178,784
December	—	30,281	22,162	277,613	863,879	2,628,878	2,199,105	450,947	214,295	49,272	62,469	1,230,127	3,926	1,392,964	1,091,604

Summary.

Requests for extension of time granted	230
Eggs	23
Butter	5
Poultry	40
Game	6
Meat	54
Fish	102
Requests for extension of time not granted	27
Poultry	1
Game	1
Meat	20
Fish	5
Articles ordered removed from storage (no requests made)	61
Butter	1
Poultry	17
Game	7
Meat	23
Fish	13

REPORT OF THE DIVISION OF COMMUNICABLE DISEASES.

GEORGE H. BIGELOW, M.D., *Director.*

This year there has been a decrease over last year in the number of cases of communicable disease reported, the figures being 90,628 and 98,421 respectively. The deaths also show some decrease. These diseases may be roughly divided into those against which we have a more or less specific and therefore effective preventive or curative weapon, and those against which our methods of attack in the present state of medical knowledge are more general and therefore less effective. In the former class may be included smallpox, diphtheria, ophthalmia neonatorum, typhoid, rabies, and syphilis. Because of the recent generalized interest in early diagnosis in childhood, tuberculosis may for the first time, perhaps, be put into this group. In the latter class fall such diseases as measles, mumps, scarlet fever, whooping cough, gonorrhea, influenza, pneumonia, and anterior poliomyelitis. Many of these seem to emulate the poor in their persistent presence, and like the poor are the incentives to much thought and theory with very little in the way of concrete accomplishment. There is, however, high hope that in the not distant future scarlet fever will be taken from this group even as diphtheria has been, and with continued freedom and stimulation of sound experimentation this whole group should eventually be wiped out. Beginnings have been made in the measles convalescent serum, pertussis vaccine, and specific pneumococcus serum, though none of these has yet reached the stage of practicality to warrant the prediction of efficient control of the respective diseases.

Smallpox. — This year there have been 12 cases and 2 deaths as compared with 2 cases and no deaths in 1923. Compared with the widespread prevalence and virulence of smallpox over this country, which will give the United States an unenviably high place in the smallpox roster of the world, we have fared well. But only as our towns and cities enforce the spirit as well as the letter of the vaccination law can a smallpox holocaust be permanently prevented.

Diphtheria. — As pointed out later, most of the decrease in diphtheria cases and deaths over 1923 occurred in the last three months of the year. In other words, the increase in prevalence which we have justly or unjustly become accustomed to associate with the opening of schools was markedly reduced. It is now three years since active immunization against this disease became generally available in Massachusetts. Annual fluctuation in the incidence of any disease is notoriously tricky as evidence of the efficacy of any measure. On the other hand, when a distinct shift in the age groups affected accompanies a decrease in the number of cases it would seem to warrant most serious consideration. In Northampton this is just what has occurred. Some two or three years ago a large number of school children were actively immunized against diphtheria. This year the number of cases was cut to about one-tenth of what it was three years ago and instead of the largest number appearing among children of school age as is the usual experience, there were no cases among school children. Surely it would be difficult to gainsay the efficacy of immunization in Northampton. This next year we hope to study intensively all communities in the State with reference to their diphtheria experience.

Although after three years it is still true that there are many communities in which Schick testing and toxin-antitoxin immunization has not even been started, and many more in which the work has not gone far enough to warrant any expectation of results, it still remains true in this as in all other public health, or even human, endeavor, that the most difficult feature is to continue the work once the enthusiasm of the initial demonstration has passed. There are not a few communities in which immunization has been fairly thoroughly done, but in which each succeeding year brings fresh groups of children into the schools to whom no effort is made to extend the benefits of this prophylaxis. As time goes on without most persistent vigil this will become increasingly true as the prevalence of diphtheria decreases even under piece-meal immunization. For it is a preventive medical

axiom that the more effective a preventive procedure is the more difficult it is to maintain public interest in it, since its very efficacy removes the surest incentive to its continued utilization, namely the ravages of the disease itself. It therefore behooves all health authorities to push most vigorously these measures which, if fully utilized, should make the disease extinct.

Ophthalmia Neonatorum. — There have been 1,820 cases reported, which is an increase of about 20 per cent over last year. But as no case of blindness has been reported this state is maintaining its enviable record for the past eight years. Since all cases of suppurative conjunctivitis in the new-born are included in this group it is not possible to state precisely in what fraction of them the gonococcus was the etiological agent. That it was large there can be no reasonable doubt. Here is a condition in which certain of the silver salts give a high degree of prophylaxis, and in the use of which both the general public and the medical profession are highly co-operative to the end that an almost unbelievable degree of efficiency in the prevention of blindness is obtained.

Typhoid Fever. — There has been an appreciable decrease in the number of cases reported this year over 1923, the figures being 566 and 622, respectively, giving a case rate per 100,000 of 14.1 which is the lowest the state has ever known. The deaths for the same periods have also decreased, being 68 and 70, respectively. Subsequently in this report the sources of infection are given where known. Recently attention has been called to shellfish from contaminated waters as a source of our residual typhoid. As these shellfish are a menace in this way only when not adequately cooked, and as they are frequently eaten raw at large banquets, one would expect the occasional dramatic outbreak easily traceable to some such gathering were these shellfish actually at fault. No such outbreak has occurred. On the other hand, there can be no doubt that improvement in the supervision of the shellfish market is desirable, if Massachusetts is to maintain its well earned reputation as regards this article of food.

Rabies. — The cases of dog-bite requiring antirabic treatment have shown but a slight decrease over last year. From past experiences we should expect a distinct drop in the next few years. Rabies came in some five years ago from Connecticut and has now extended north and slightly east. The preventive inoculation of dogs is apparently effective and should be encouraged, but the Division of Animal Industry of the Department of Conservation does not feel that it would be wise at this time to make such immunization prerequisite to licensing. Effective control can be obtained through enforced licensing and zone quarantine.

There has been but one death from rabies and that in a man who delayed preventive inoculations till after the onset of symptoms. With so much known rabies in animals, and so many known bites by these same rabid animals, it is another tribute to the Pasteur prophylaxis against this disease that more deaths do not occur.

Syphilis. — For the first time since 1919 there has been an increase in the number of cases reported, the figure 2,325 exceeding the two preceding years. This would seem to indicate an increased realization of the public health significance of this disease rather than of necessity an increase in its prevalence. Syphilis will be considered further when the whole problem of the Department's place in venereal disease control is discussed.

Tuberculosis. — The many details and accomplishments incident to the control of this disease are given in the report of the Division of Tuberculosis. It would, however, seem worth while to reiterate that this disease has definitely been taken out of the class of those in which little or nothing could be constructively done in the way of treatment once the diagnosis was made, and even less in the way of prevention. Not long since it was, perhaps, the prime example of a communicable disease in which we were preventively futile. Now, however, we would seem to have much to offer.

With the advent of the state clinics for the recognition of early tuberculosis in children our statistics will be kept under three heads, *i.e.*, tuberculosis (1) pulmonary, (2) hilum, and (3) other forms. Thus they will be comparable with the past classifications of tuberculosis (1) pulmonary, and (2) other forms.

Now as to the group of diseases in which we have no specific therapeutic or pro-

phylactic procedure at present practically available, on what must our hope of control depend? It rests first on early recognition, which necessitates a high degree of education of the public as to the need of calling medical aid early in conditions which may appear trivial and a high degree of skill on the part of physicians to differentiate conditions many of which start with symptoms differing but slightly from those of a common cold. It is in this stage presumably that many of these diseases are most highly communicable and except in the presence of epidemics the most difficult of definite differentiation. The constantly improving medical and nursing service in our schools is a great aid in this early diagnosis and is the primary reason for the department's policy of keeping the schools open in the presence of communicable disease.

The second factor in which we must trust in controlling this group of diseases is isolation or quarantine. This is difficult when hospitalization is not possible, and particularly so when the condition is mild and the patient shows merely transient or even no prostration. In specific instances police aid may be called in, but this is expensive and cumbersome, and in the long run isolation is as effective as public sentiment demands. The problem then is to educate the public as to the demands of reasonable quarantine.

Mumps and scarlet fever showed an increase in cases over last year, but about the same number of deaths. This indicates the general mildness of the disease, and it was this mildness that made any effort at control so baffling. It was a frequent story that the school nurse would discover a peeling child in the schools whose previous symptoms had been too mild to suggest scarlet fever. There is little wonder that the disease spread in spite of efforts at isolation. There is reason to suppose that in the not distant future there will be practically available all the biological and serological weapons which we now have against diphtheria, *i.e.*, antitoxin for therapeusis and passive immunization, toxin for testing susceptibility, and toxin-antitoxin for active immunization. Then 14,410 cases of scarlet fever will be just as inexcusable, however mild, as are our 7,290 cases of diphtheria now.

Measles and whooping cough showed a decrease in cases and deaths, the latter showing only about one-third the prevalence of last year. In measles the relative decrease in deaths over 1923 was about three times as great as was the decrease in cases. This would suggest a milder form of this disease also.

The fewest cases of influenza are recorded since 1918 when the disease was first made reportable, though there were fewer deaths attributed to this disease in 1921. There is still so much difference of opinion as to just what the clinical entity "influenza" is that these figures should, perhaps, not be taken too literally. On the other hand, since a susceptible population is a prerequisite to an epidemic, this consistent decrease in reported cases since 1918 should put us on our guard.

Lobar pneumonia showed about 5 per cent decrease in cases with about a 20 per cent decrease in deaths. Although broncho-pneumonia is the conventional sequela of influenza it is interesting that the annual fluctuations of reported lobar pneumonia since 1918 have roughly followed those of influenza. Not a few states ask that all forms of pneumonia be reported on the grounds that the etiological agent may be spread from person to person as is the pneumococcus in lobar pneumonia. In some communities rigid quarantine is enforced with what is claimed to be excellent results. The Department does not feel that the value of such strict measures has been unassailably proven, and is of the opinion that more may be lost than gained by extending reporting to diseases in which there is neither a practical therapeutic or prophylactic procedure available.

Anterior poliomyelitis had 277 cases reported as compared with 223 last year. The increase did not start till late August, reaching an abrupt peak in September, and then falling back to "normal." This was later than any previous increases, and it is interesting to surmise what influence the predictions as to increased cases may have had. There are many instances, particularly in non-paralytic cases, of a confusion in diagnosis between anterior poliomyelitis and encephalitis lethargica, and this year the cases of the latter dropped to 40 per cent of 1923. However, it is certainly worthy of note that this is the largest poliomyelitis year since 1920, which maintains the four year cycle started in 1916.

Like syphilis, gonorrhea showed the first increase in reported cases over the previous year since 1919. As in syphilis, this is felt to indicate an increase in medical interest rather than of necessity meaning an increase in the prevalence of the disease.

ALTERED ATTITUDE TOWARDS THE VENEREAL DISEASE PROBLEM.

Any program directed towards the control of gonorrhea and syphilis has three distinct phases: (1) treatment, (2) police control with especial reference to prostitution, and (3) the broad educational aspects commonly included under such terms as sex education, social hygiene and the like. With the advent of this work under the pressure of war it was felt that each health department should co-ordinate and direct these various phases, if not actually undertaking them itself. In the light of that experience there is now some reason to suppose that some of this work as undertaken by these health departments was the result of overzealousness and overexpansion and was not the proper function of a health department at all. With this in mind, and in view of a sharply limited staff and appropriation with which it was imperative to show the greatest possible in the way of definite accomplishment, the Department has decided that for the immediate future at least its activities will be limited to what may be broadly classified under the term treatment. Certain complex specific therapeutic agents are distributed by the State. It would be absurd to distribute these without a proper place for their administration. Therefore, we are deeply interested in every possible move to increase and improve office and clinic service. Again service is worthless unless it is used. Therefore education of the community as to the seriousness of these diseases, the need and availability of treatment, and the importance of furthering and extending these treatment resources comes within this phase of the work. To express it in another way, education as to gonorrhea and syphilis is our present province; education as to promiscuity is not. The Department would deplore the appearance of belittling the importance of the other phases of this problem, but it does feel at this time that police control and general education as to social hygiene, or what you will, are the functions of some other departments of government.

With this end in view the Subdivision of Venereal Diseases of the Division of Communicable Diseases has been done away with in order that the handling of these diseases may be more closely correlated with the other work of the Division of Communicable Diseases. This has the great advantage of putting the responsibility for advising and supervising and furthering the work in each health district on the respective District Health Officer. He is the most logical contact between the physicians, boards of health, and communities in general and the Department. It would seem self-evident that since the Department has not (and it would be undesirable for it to have) sufficient staff to handle with anything approaching adequacy the multiple ramifications of these diseases all over the State, we will succeed in our part of this program just insofar as we are able to arouse the local authorities to assume active responsibility for these diseases in their communities.

Another step in this direction may be accomplished through some alteration in the methods of reporting gonorrhea and syphilis which the Department has under consideration. Would not the sending of the number of the original case, with the name only if the patient ceased regular treatment, directly to the local board of health by the local physician act as a distinct stimulus to local activity? At present such reports are attenuated by coming to the local boards through this Department. The small community where such direct reporting might act as the greatest deterrent does not report at present, only 3 per cent of the cases coming from towns under 2,500. Also the law requiring the destruction of gonorrhea and syphilis records after five years would apply to the local boards as well as to the State Department. Then, too, is there not danger of becoming too sensitive of the communicable gonorrhea and syphilis patient who after repeated warnings still refuses treatment? He is fully as great an economic and social menace as the smallpox patient. How many of us would sentimentalize over an escaped and recalcitrant leper?

As adjuncts to the District Health Officers in this program, we are retaining two socially trained women for clinic and community study and stimulation, and

two men, one of whom has spent much time in correlating court and clinic work, and the other who has interested the drug stores in the menace of the quack cure. All of these are interested in the multiple phases of the effective martialing and extending of community resources for the adequate treatment of these diseases.

THE DISTRICT HEALTH OFFICERS.

As in previous years, the State has been divided into seven health districts with a health officer located in each. They are the direct representatives of the Commissioner in their respective districts and are responsible for furthering all the departmental programs. Because more than half of their contacts have to do with the various phases of communicable disease control and for administrative simplicity, they are considered among the personnel of the Division of Communicable Diseases. The most effective utilization of this staff is of immediate practical importance to the Department in order that the greatest return may be realized on the expenditure. But a thoughtful consideration of this matter is demanded even more, perhaps, because of its influence in the evolution of public health administration not only in this State but elsewhere in the country.

There are two antithetical views of the health officer in the field, when the field is as large as a whole State. He may be given a fraction of the whole field to till intensively with multiple seed. By limiting the field he has the opportunity to become acquainted with the personal needs, interests, backgrounds, prejudices and all the multiple economic, social, racial, religious and personal detail which give the individual flavor peculiar to each city and town in the Commonwealth. He should know well his boards of health, school committees, and other local governmental bodies, as well as his strong and weak men and women in each community. This necessitates time and an interest in personalities. With this background he brings to each community the multiple health programs, varying his method of approach to the local idiosyncrasies with which he is familiar. He is analogous to the general practitioner who knows his families sometimes for three generations, their hopes, aspirations and tragic failings, so frequently vital to the proper individualization of the given case.

On the other hand, with the rapid scientific advances of the last generation and the increasing practicability of the application of these particularly during the last few years, the multiplicity of projects which a conscientious department of public health must actively push becomes at times bewildering. Nutrition, diphtheria immunization, modern tuberculosis control (to mention only a few) have so much detail to be mastered, and are so encrusted with both fact and fancy that each can be most accurately furthered by one devoting his time exclusively to a single subject. He can then speak "as one having authority and not as the scribes." This man would have only a single project and a State-wide field. This is exactly the reasoning back of the development of the multiple medical and surgical specialties against which it has become the fashion to raise such a hue and cry.

We are then faced with the choice between the public health generalist and the public health specialist, as we have been increasingly faced by these persons in private health. Much can be said for each. One of the most difficult administrative problems facing the Department is that of having all members of the staff with the multiple contacts in multiple communities say the same thing about each detail of all the programs. So much is unknown, so much is being constantly found out, and so much may never be answered accurately. On the other hand, more projects in a given community miss fire probably through local personality difficulties than through lack of definition of the minutæ of a given project, however detrimental this latter may be. Again the generalist in the limited field may furnish just the factor necessary to a continuance of the particular preventive program in a given community after the first blush of enthusiasm for the novel has passed. It sometimes appears as if popular public health consisted exclusively of the demonstration, while sound public health insisted on a continuation of good works once begun. Therefore it would seem that, for the present at least, our set-up of a generalist in each health district, aided by specialists in tuberculosis, nutrition, venereal diseases and what-not should give the largest returns in ultimate accomplishment.

In view of the above it is interesting that more than one of the District Health Officers in his annual report suggested more frequent meetings with other divisions of the Department. The balance between having such meetings so infrequently as to give a sense of divisional isolation and so frequent as to give an equally undesirable sense of divisional redundancy is difficult and must be worked out. The reports were about equally divided in regard to the profitableness of jail and lock-up inspection. Various points in which the departmental policy needs clearer definition were indicated. One report sounded a distinctly optimistic note as to the increased sense of community responsibility for matters pertaining to the public health as reflected in the improved caliber of persons elected to boards of health.

For the following year the most important single projects to be furthered by the District Health Officers are compliance with the vaccination law, diphtheria prevention through the Schick test and toxin-antitoxin immunization, the childhood tuberculosis clinic and follow-up by the communities, the popularization of maternal and infant hygiene work with reference to prenatal and postnatal care, and the arousing of localities to their gonorrhea and syphilis problem. In addition there are the multiple advisory, consultative and supervisory functions which have accumulated about this position. Surely an exacting and stimulating work and one requiring a high degree of versatility and persistence.

THE BACTERIOLOGICAL LABORATORY.

During the year 34,468 specimens were examined in the Bacteriological Laboratory. This gives an average of about 114 examinations per working day. November was the heaviest month since the opening of the laboratory, when 200 examinations a day were made. The bulk of this was throat cultures. Although the fall diphtheria was the lowest for years, still the diphtheria contact cultures were unusually numerous. The obvious question is, was not the low diphtheria incidence a result of the multiple school culturing? It can be stated with assurance that wholesale throat culturing has never accomplished anything in the control of diphtheria that could not have been accomplished by intelligent selective culturing. The time saved by employing the latter method should be used in Schick testing and active immunization, which will give lasting results. The war taught many of us bad habits in this respect, giving us a false sense of accomplishment following the expenditure of considerable effort incident to wholesale culturing.

It is interesting that of the fixed types of pneumococci reported, by far the largest number (approximately 25 per cent) were Type III. This has generally been found to be the most fatal of the types. If this percentage held good all over the State it might well be reflected in the case fatality rate, which this year was roughly 50 per cent. Consideration of the figures in the Epidemiologist's report, however, shows that this rate has been higher though not in the last two years. In weighing this point, inadequacies of report must be clearly kept in mind. These are due in part to difficulties incident to differential diagnosis, and in part to not realizing clearly that lobar pneumonia is a reportable disease.

The work of the Laboratory is summarized in the following tables:

TABLE I. — *Showing the Number and Kinds of Examinations.*

Diphtheria	23,193	Gonorrhea	3,625
Tuberculosis	4,037	Malaria	62
Typhoid fever:		Miscellaneous	938 ¹
Widal test	1,658		
Culture test	955		

¹ Including 448 pneumococcus type determinations, 226 tests for hemolytic streptococci, 32 guinea pig inoculations for tubercle bacilli.

TABLE II. — *Showing the Results of Examinations.*

	Positive.	Negative.	Atypical.	Total.
Diphtheria (primary)	1,332	15,716	—	17,048
Diphtheria (release)	2,003	4,142	—	6,145
Tuberculosis (sputum)	1,016	3,021	—	4,037
Typhoid fever (Widal test)	305	1,312	41	1,658
Typhoid fever (culture test)	90	865	—	955
Malaria	2	60	—	62
Gonorrhea	673	2,952	—	3,625
Miscellaneous	—	—	—	938
Total	—	—	—	34,468

There have been the following changes in personnel of the Division during the year:

December 1, 1923: Eight Nursing Assistants transferred to the Division of Tuberculosis.

December 15, 1923: Carey, Bernard W., M.D., resigned as Director of the Division.

March 1, 1924: Bigelow, George H., M.D., appointed Director of the Division.

July 1, 1924: Hayward, Alice W., appointed as Assistant Bacteriologist in the Diagnostic Laboratory.

November 30, 1924: Pfeiffer, Albert, M.D., resigned as Chief of the Subdivision of Venereal Diseases.

November 30, 1924: Milliken, Charles W., M.D., resigned as District Health Officer of the Southeastern Health District.

During the year the members of the Division staff have collected data for a study of the rural medical situation throughout the State. This study was made by the Department at the direction of the Legislature. It came out quite clearly that the predominant factor in the shortage of physicians' services was economic isolation.

Some of the matters demanding attention in the near future and in the solution of which this Division must play a part are improved supervision of summer and automobile camps, extension of comfort station facilities particularly to beaches and summer resorts where large numbers of persons congregate during a part of the year, and the investigation and control of shellfish from contaminated waters.

REPORT OF EPIDEMIOLOGIST FOR 1924.

Scarlet Fever.

An outstanding feature of the communicable disease situation in 1924 was the continued general prevalence of scarlet fever. Cases were reported by months as follows: January, 2,082; February, 2,076; March, 2,100; April, 1,719; May, 1,447; June, 911; July, 381; August, 237; September, 367; October, 742; November, 937; December, 1,411; Total, 14,410.

The following table shows the distribution of cases according to population throughout the State:

	Population.	Per Cent.	Cases.	Per Cent.	Number of Cities and Towns.
Boston	800,000	20	3,600	24.98	1
Other cities and towns over 10,000 population	2,400,000	60	8,942	62.05	65
Cities and towns under 10,000 population	800,000	20	1,868	12.97	288
	4,000,000	100	14,410	100.00	354

The great prevalence of scarlet fever in the last 2 years is attributable largely to the mildness of the disease. Contact infection has been the source of practically all cases in the last 2 years. During 1924 no outbreaks of scarlet fever were traced to milk infection.

With a disease so mild as scarlet fever is at present, being comparable to measles in severity, diagnosis is rendered difficult and isolation irksome.

It has been a frequent experience for diagnosis to be made only after desquamation had begun, which means that no attempt at isolation had been made during the most infectious stage.

Cases and deaths from scarlet fever in the last ten years have ranged as follows:

YEAR.	Cases.	Case Rate per 100,000.	Deaths.	Death Rate per 100,000.	Fatality. Per Cent.
1915-1919 (av.)	6,669	177	127	3.4	1.90
1920	10,260	265	215	5.5	2.10
1921	8,331	214	191	4.9	2.30
1922	7,868	200	149	3.8	1.90
1923	12,300	310	155	3.9	1.26
1924	14,410	360	157	3.9	1.10

Tuberculosis.

The death rate from tuberculosis, both pulmonary and non-pulmonary, has been falling so rapidly since 1918 that we have naturally expected it to continue in its decline. The experience of the year 1924 seems to indicate that we are not justified in such sanguine expectations. While the death rate for this year has not changed greatly from that of last year, it may well serve as an indication that regularity of decline is not to be anticipated from one year to the next. It may also serve as a stimulus to public interest in the prevention of tuberculosis through intensive activity in child hygiene.

Tuberculosis, Pulmonary.

YEAR.	Cases.	Case Rate per 100,000.	Deaths.	Death Rate per 100,000.	Fatality. Per Cent.
1915-1919 (av.)	7,820	207	4,938	120.3	63
1920	6,696	174	3,750	97.3	56
1921	6,168	159	3,272	84.2	53
1922	5,562	141	3,167	80.5	57
1923	5,356	135	3,062	77.1	57
1924	5,376	134	2,975	74.3	55

In order to determine the relative frequency of tuberculosis deaths in large and small communities the following tabulation was made. Lakeville, Rutland and North Reading were excepted from towns under 10,000 population on account of the presence there of State sanatoria. It will be observed that the tuberculosis death rate for towns under 10,000 population (89) was higher than for the State as a whole (80.5) and higher than for any of the higher population groups. The lowest death rate was found for cities between 25,000 and 50,000 population (55).

Tuberculosis, Pulmonary — Deaths, 1922.

	TUBERCULOSIS DEATHS.		ALL DEATHS.		POPULATION.		Tuberculosis Death Rate Per 100,000.
	Num-ber.	Per Cent.	Num-ber.	Per Cent.	Num-ber.	Per Cent.	
STATE	3,167	100.00	51,115	100.00	3,936,064	100.00	80.5
Cities over 100,000 population (8 cities)	1,410	44.50	23,156	45.30	1,653,709	42.00	85.2
Cities from 50 to 100,000 population (6 cities)	260	8.20	4,856	9.50	423,858	10.90	60.6
Cities from 25 to 50,000 population (13 cities)	293	9.25	6,035	11.80	533,866	13.60	55.0
Cities from 15 to 25,000 population (16 cities)	207	6.54	3,743	7.33	318,068	8.10	65.1
Cities from 10 to 15,000 population (24 cities)	178	5.60	3,627	7.10	304,853	7.75	58.4
	2,348	74.09	41,417	81.00	3,239,354	82.35	77.5
Add Lakeville, Rutland and North Reading	204	6.45	—	—	4,319	.11	—
	2,552	80.50	—	—	3,243,673	82.46	—
Towns under 10,000 population (except Lakeville, Rutland, North Reading)	615	19.50	—	—	690,000	17.54	89.1

Tuberculosis, Non-Pulmonary.

YEAR.	Cases.	Case Rate per 100,000.	Deaths.	Death Rate per 100,000.	Fatality. Per Cent.
1915-1919 (av.)	757	20.0	810	21.5	(Over 100)
1920	800	20.8	650	16.8	81.0
1921	827	21.2	595	15.3	72.0
1922	817	20.8	569	14.4	69.5
1923	807	20.5	525	13.4	65.0
1924	946	23.6	545	13.6	57.6

Diphtheria.

The striking feature in connection with diphtheria this year has been the falling off in the number of cases and deaths in the last 4 months of the year, as compared to 1923. While we are not yet justified in assuming that this marks the beginning of a permanent reduction in the prevalence and mortality in diphtheria, we may perhaps hope that the intensive educational campaign of the last three years is beginning to show results. Whereas the prevalence of diphtheria has regularly reached its height in November each year, this year in November only about half the anticipated number of cases was reported. Better still, the deaths in the last 4 months of the year are far below the number for the corresponding months in recent years.

Diphtheria Cases by Age Groups, 1918-1924.

YEAR.	Under 6.	6-14.	15 and Over.	Unknown.	Total.
1918	2,498	2,435	1,309	680	6,922
1919	2,724	3,330	1,159	716	7,929
1920	2,612	2,959	1,153	789	7,513
1921	3,259	3,841	1,244	756	9,100
1922	3,414	3,623	1,169	620	8,826
1923	3,440	3,917	1,158	503	9,018
1924	2,859	2,690	1,040	701	7,290

Massachusetts Diphtheria Deaths by Age Groups.

AGE.	1923.	1922.	1921.	1920.	1919.	1918.	1917.	1916.	1915.	1914.
0-1	38	55	32	41	27	50	56	33	59	53
1	67	90	63	74	70	77	103	114	112	108
2	76	82	68	81	97	77	111	90	102	74
3	89	68	90	75	78	84	99	85	90	84
4	64	79	72	63	69	53	87	73	68	79
5-9	193	176	213	197	190	178	268	179	208	178
10-14	21	26	40	34	32	43	58	24	49	34
15-19	9	10	3	10	9	10	14	8	11	17

Diphtheria Cases and Deaths by Months for 1923 and 1924.

YEAR.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
1923.													
Cases	890	655	698	609	594	613	482	559	605	1,060	1,151	1,102	9,018
Deaths	80	56	58	35	35	33	32	34	37	63	61	55	579
1924.													
Cases	1,079	829	629	672	559	532	412	380	318	583	620	677	7,290
Deaths	71	61	52	66	49	29	34	33	21	26	46	35	523

Diphtheria.

YEAR.	Cases.	Case Rate per 100,000.	Deaths.	Death Rate per 100,000.	Fatality Per Cent.
1915-1919 (av.)	8,347	221	677	17.9	8.12
1920	7,513	195	591	15.3	7.86
1921	9,100	234	607	15.6	6.74
1922	8,826	224	606	15.4	6.87
1923	9,018	227	583	14.7	6.45
1924	7,290	182	523	13.1	7.20

Typhoid Fever.

In general typhoid fever has continued to decline as heretofore, in prevalence. Four small outbreaks were recorded as follows:

MONTH.	Place.	Cases.	Origin.
August	Wakefield	6	Milk (carrier).
September	Fitchburg	12	Milk (carrier).
September	Gardner	6	Milk (carrier).
December	Pittsfield	18	Water.

Undue prevalence was observed (15 cases) in New Bedford during August, September and October. These cases were attributed to eating shellfish from polluted waters.

YEAR.	Cases.	Case Rate per 100,000.	Deaths.	Death Rate per 100,000.	Fatality. Per Cent.
1915-1919 (av.)	1,454	38.7	172	4.6	11.8
1920	935	24.2	95	2.5	10.2
1921	917	23.6	119	3.1	13.0
1922	693	17.6	86	2.2	12.4
1923	622	15.7	70	1.8	11.2
1924	566	14.1	68	1.7	12.0

Four typhoid bacillus carriers were discovered during the year. Together they are presumed to have caused 28 cases, chiefly through the agency of milk. Only one of the four carriers gave a history of having had typhoid fever.

Typhoid fever cases in 1923 and 1924 were classified as to origin as follows:

Typhoid Cases, 1920-24, classified as to Probable Origin.

YEAR.	Total.	Contact.	Milk.	Water.	Food.	Carrier.	Unknown.	Per Cent.
1920	935	56	50	32	4	46	747	(80)
1921	917	95	146	6	—	13	657	(72)
1922	693	66	18	5	6	5	593	(85)
1923	622	30	9	23	3	15	542	(87)
1924	566	51	17	25	15	4	454	(80)

So large a proportion of cases of unknown origin is not to be wondered at in view of the amount of travelling that is done at the present time. Food eaten away from home, water and milk of unknown source, bathing in polluted water all play their part in the year's total of typhoid cases. Carriers are seldom discovered or even suspected unless they chance to infect a considerable number of people at the same time through the agency of food or milk.

No information as to source can be drawn from the age distribution of cases, which is in close agreement with the age distribution of the population.

Anterior Poliomyelitis.

Cases and deaths from poliomyelitis were recorded in 1923 and 1924 by months as follows:

YEAR.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
1923.													
Cases	10	9	5	6	4	4	8	26	38	48	40	25	223
Deaths	2	2	2	—	2	1	4	4	3	6	6	2	35
1924.													
Cases	14	6	9	7	5	5	12	39	88	56	23	13	277
Deaths	—	1	1	3	2	1	2	5	6	2	1	3	27

Contrary to expectations held by some, the increase in cases this year in the summer and early fall was not comparable to that experienced in 1916 and 1920. Deaths recorded for the four months: July, August, September and October this year (15) were actually less than for the same period last year (17).

Nineteen cases in Fall River and one in Westport occurring between the end of July and the middle of September were investigated and histories taken. The mode of transmission of poliomyelitis is still unknown. Cases occurring in the same neighborhood, having an onset within a week of each other are assumed to have been infected at or about the same time. No instances were found in which there was known contact between cases having their onset more than eight days apart.

Smallpox.

Smallpox occurred in 12 cases this year, distributed as follows. There were 2 deaths.

MONTH.	Place.	Cases.	Origin.
January	Taunton	1	Imported.
January	Springfield	1	Imported.
February	Taunton	2 ¹	Contact.
March	Taunton	1 ²	Contact.
May	Huntington	2	Contact (original case not discovered).
May	Buckland	1	Contact with undiagnosed imported case.
June	Buckland	1	Contact.
June	Brockton	1	Unknown.
July	Brockton	2	Contact.
		12 ³	

Vaccination history was sought in each case. Two cases (Brockton) were said to have been vaccinated within 7 years (before known exposure) but no report of typical scar was obtained.

These small localized outbreaks served to call to the attention of school authorities and boards of health that, especially in the small towns, a considerable proportion of the school children were unvaccinated. By circular letter and personal interview an effort was made to stimulate compliance with the vaccination law.

In view of the experience of many other States, Massachusetts has been fortunate this year, with regard to smallpox outbreaks.

Smallpox.

YEAR.	Cases.	Deaths.
1915-1919 (av.)	38	4
1920	29	2
1921	37	—
1922	2	—
1923	2	—
1924	12	2

Gonorrhea and Syphilis.

YEAR.	GONORRHEA.		SYPHILIS.		Death Rate per 100,000.
	Cases.	Deaths.	Cases.	Deaths.	
1918	7,681	6	3,284	280	7.20
1919	9,435	8	4,127	281	7.30
1920	7,225	6	2,987	224	5.80
1921	5,563	6	2,497	200	5.15
1922	4,973	13	1,933	213	5.40
1923	4,885	3	1,891	194	4.90
1924	5,241	11	2,325	175	4.40

Reported cases of gonorrhea and syphilis, which have been falling off regularly since 1919 (not reportable before 1918) have increased somewhat this year. This increase is looked upon as a sign of increased interest in the venereal disease problem and better disposition to report cases. As in former years the great majority of reports came from clinics, and about half of all from the Boston clinics. With the increasing number of clinics established each year it is to be expected that reports will increase correspondingly. Deaths registered as due to syphilis as a primary cause continue to decrease slowly but with gratifying regularity.

¹ 1 death.² Died.³ 2 deaths.

Distribution of Arsphenamine, Sulpharsphenamine and Bichloridol, by Years.

YEAR.	Arsphenamine. ¹	Sulpharsphenamine. ¹	Bichloridol. ²
1919	20,455	—	—
1920	25,364	—	—
1921	36,854	—	—
1922	42,083	—	9,680
1923	42,843	3,737 ³	12,800
1924	27,603	18,864	13,412

January to December, 1924.

CLINIC.	New Cases.	Total Treatments.	Treatments per New Patient.	Treatments per 100,000 Population.
Attleboro	26	317	12.2	1,533
Boston City Hospital	641	— ⁴	—	—
Boston Dispensary	1,754	64,113	36.6	11,000 ⁵
Mass. General Hospital	1,259	12,708	10.1	
Mass. Homeopathic Hospital	259	5,678	21.9	
Brockton	35	1,197	34.2	1,730
Fall River	127	6,715	52.9	5,720
Fitchburg	58	806	13.9	1,920
Haverhill	57	1,957	34.3	3,420
Holyoke	47	1,160	24.7	1,940
Lawrence	118	2,250	19.0	2,320
Lowell	202	3,970	19.3	3,410
Lynn	67	2,630	39.2	2,590
New Bedford	288	7,786	27.0	6,000
Pittsfield	17	476	28.6	1,100
Salem	88	1,354	15.4	2,920
Springfield	147	4,221	28.7	2,820
Worcester	182	3,154	17.3	1,640

Epidemic Cerebrospinal Meningitis.

YEAR.	Cases.	Case Rate per 100,000.	Deaths.	Death Rate per 100,000.
1915-19 (av.)	224	5.9	168	4.40
1920	182	4.7	129	3.26
1921	164	4.2	49	1.26
1922	105	2.7	47	1.19
1923	121	3.0	50	1.26
1924	128	3.2	42	1.00

Influenza.⁶

YEAR.	Cases.	Case Rate per 100,000.	Deaths.	Death Rate per 100,000.
1918	145,262	3,818.0	13,783	362.3
1919	40,417	1,053.0	3,052	79.5
1920	36,312	938.0	1,623	42.1
1921	735	18.9	153	3.9
1922	7,453	190.0	569	14.5
1923	2,466	62.2	742	18.7
1924	405	10.1	284	7.1

¹ Based on 0.6 gram doses.² Collapsules.³ June to December.⁴ Not given.⁵ Incomplete.⁶ Made reportable in 1918.

*Lobar Pneumonia.*¹

YEAR.	Cases.	Case Rate per 100,000.	Deaths.	Death Rate per 100,000.
1918	13,374	351	10,339	271.7
1919	4,585	119	2,508	65.5
1920	5,558	143	2,842	73.8
1921	4,080	105	1,823	46.9
1922	5,194	132	2,347	59.6
1923	4,759	120	2,313	58.2
1924	4,552	114	1,931	48.2

Measles.

YEAR.	Cases.	Case Rate per 100,000.	Deaths.	Death Rate per 100,000.
1915-1919 (av.)	22,284	592	325	8.62
1920	32,141	835	352	9.10
1921	17,827	459	179	4.60
1922	23,291	593	218	5.50
1923	26,854	676	321	8.10
1924	22,425	560	168	4.20

Whooping Cough.

YEAR.	Cases.	Case Rate per 100,000.	Deaths.	Death Rate per 100,000.
1915-19 (av.)	6,200	164	384	10.1
1920	9,994	260	546	14.2
1921	5,703	147	201	5.2
1922	6,823	173	294	7.5
1923	10,612	268	493	12.4
1924	4,062	101	145	3.6

¹ Made reportable in 1917.*Cases and Deaths from Certain Communicable Diseases in Massachusetts from 1915 to 1924.*

YEAR.	ACTINOMYCOSIS.		ANTHRAX.		CHICKEN POX.		DOG BITE.		DYSENTERY.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
1915	8	4	11	4	5,512	5	169	—	239	92
1916	4	—	31	5	4,672	5	24	—	119	83
1917	4	3	54	11	7,210	20	26	—	160	64
1918	1	—	23	7	4,417	8	20	—	79	75
1919	3	—	18	1	6,693	5	54	—	23	9
1920	3	1	17	4	5,355	11	67	—	37	26
1921	2	1	6	—	8,324	9	118	—	25	24
1922	3	2	3	1	5,177	8	181	—	14	10
1923	6	4	7	2	7,953	11	252	—	3	2
1924	4	2	11	1	8,985	8	214	—	25	5

Cases and Deaths from Certain Communicable Diseases in Massachusetts from 1915 to 1924—Continued.

YEAR.	ENCEPHALITIS LETHARGICA.		GERMAN MEASLES.		MALARIA.		MUMPS.		OPHTHALMIA NEONATORUM. ¹	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
1915	—	—	500	1	112	6	2,128	1	2,894	—
1916	—	—	591	1	97	4	2,318	3	1,932	—
1917	—	—	5,890	5	78	5	7,125	5	2,325	—
1918	—	—	9,426	8	82	5	4,972	9	1,877	—
1919	—	—	434	1	72	4	3,497	10	1,687	—
1920	—	—	480	—	60	5	5,962	6	1,638	—
1921	117	81	648	1	49	2	3,952	7	1,573	—
1922	163	83	480	2	48	4	4,358	2	1,219	—
1923	180	85	527	—	23	3	7,707	6	1,480	—
1924	106	58	1,644	2	36	1	9,431	10	1,820	—

¹ Also suppurative conjunctivitis.

Cases and Deaths from Certain Communicable Diseases in Massachusetts from 1915 to 1924—Continued.

YEAR.	PELLAGRA.		SEPTIC SORE THROAT.		TETANUS.		TRACHOMA.		TRICHINOSIS.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
1915	33	26	865	—	32	33	50	—	—	—
1916	47	37	169	67	34	31	88	—	24	3
1917	28	20	270	59	28	15	87	—	3	2
1918	19	21	107	25	27	33	103	—	15	—
1919	13	15	216	40	21	22	72	—	3	—
1920	16	14	153	29	25	21	87	—	5	—
1921	14	14	140	42	39	28	97	—	10	1
1922	15	9	123	25	33	21	96	—	19	4
1923	16	11	197	27	28	18	62	—	13	—
1924	16	10	170	47	41	23	55	—	40	1

Cases and Deaths from Certain Communicable Diseases in Massachusetts from 1915 to 1924—Concluded.

YEAR.	GLANDERS.		HOOKWORM DISEASE.		LEPROSY.		RABIES.		TYPHUS FEVER.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
1915	2	2	—	—	2	1	5	5	—	—
1916	—	—	—	—	2	2	—	—	—	—
1917	2	1	—	—	3	1	—	—	—	—
1918	—	—	—	—	3	—	—	—	2	1
1919	—	—	—	—	3	1	1	1	—	—
1920	—	—	—	—	3	3	—	—	—	—
1921	—	—	1	—	1	1	1	3	2	1
1922	—	—	42	—	1	—	2	5	—	—
1923	—	—	12	—	1	—	3	1	1	—
1924	—	—	18	—	—	—	1	1	—	—

Cases and Deaths, with Case and Death Rates per 100,000 Population for All Reportable Diseases during the Year 1924.

DISEASE.	Cases.	Deaths.	Case Rate.	Death Rate.	Fatality Rate (Per Cent).
Actinomycosis	4	2	.1	.05	50.0
Anterior Poliomyelitis	277	27	6.9	.7	9.7
Anthrax	11	1	.3	.02	9.1
Chicken Pox	8,985	8	224.5	.2	.08
Diphtheria	7,290	523	182.1	13.1	7.2
Dog Bite ¹	208	—	5.2	—	—
Dysentery	25	5	.6	.1	20.0
Encephalitis Lethargica	106	58	2.6	1.4	54.7
Epidemic Cerebrospinal Meningitis	128	42	3.2	1.0	32.8
German Measles	1,644	2	41.1	.05	.1
Gonorrhea	5,241	11	130.9	.3	.2
Hookworm	18	—	.4	—	—
Influenza	405	284	10.1	7.1	70.1
Malaria	36	1	.9	.02	2.8
Measles	22,425	168	560.2	4.2	.7
Mumps	9,431	10	235.6	.2	.1
Ophthalmia Neonatorum ²	1,820	—	45.5	—	—
Pellagra	18	10	.4	.2	55.6
Pneumonia, Lobar	4,552	1,931	113.7	48.2	42.4
Rabies	1	1	.02	.02	100.0
Scarlet Fever	14,410	157	359.9	3.9	1.1
Septic Sore Throat	170	47	4.2	1.2	27.6
Smallpox	12	2	.3	.05	16.7
Syphilis	2,325	175	58.1	4.4	7.5
Tetanus	41	23	1.0	.6	56.1
Trachoma	55	—	1.4	—	—
Trichinosis	40	1	1.0	.02	2.5
Tuberculosis, Pulmonary	5,376	2,975	134.3	74.2	55.3
Tuberculosis, Other Forms	946	545	23.6	13.6	57.6
Typhoid Fever	566	68	14.1	1.7	12.0
Whooping Cough	4,062	145	101.5	3.6	3.6
	90,628	7,222	2,263.9	180.4	8.0

¹ Requiring antirabic treatment.

² Includes suppurative conjunctivitis.

Cases and Deaths from Communicable Diseases by Months, 1924.

	JAN- UARY.		FEB- RUARY.		MARCH.		APRIL.		MAY.		JUNE.		JULY.		AUGUST.		SEP- TEMBER.		OCTOBER.		NO- VEMBER.		DE- CEMBER.		TOTAL.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Actinomycosis	1	1	6	1	9	1	7	3	2	2	1	1	12	2	39	5	88	6	56	2	23	1	13	3	4	2
Anterior Poliomyelitis	14	-	1	-	-	-	1	1	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	277	27
Anthrax	1747	-	1260	1	1121	1	817	1	705	1	481	2	229	1	59	1	66	-	352	2	906	3	13	3	11	1
Chicken Pox	1079	71	829	61	629	52	672	66	559	49	532	29	412	34	380	33	318	21	583	26	620	46	677	35	8985	8
Diphtheria	9	-	9	-	26	-	14	-	15	-	27	-	21	-	18	-	31	-	11	-	19	-	8	-	7290	523
Dog Bite	1	1	1	1	-	-	-	-	-	-	1	-	4	1	5	-	6	1	6	1	1	1	-	-	208	5
Dysentery	11	5	4	3	8	4	5	6	8	6	11	2	7	5	5	2	8	8	8	2	7	2	24	13	25	58
Encephalitis Lethargica	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Epidemic Cerebrospinal Meningitis	10	4	3	12	5	6	9	1	8	3	20	8	8	3	7	3	17	5	14	4	5	2	3	1	128	42
German Measles	66	107	107	195	360	1	360	1	370	1	209	60	10	1	10	1	11	11	17	1	34	2	205	1644	2	2
Gonorrhea	458	1	386	-	419	1	393	3	406	1	398	2	458	1	554	4	442	-	420	1	427	1	480	-	5243	11
Hookworm	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	18	-
Influenza	47	33	40	32	52	41	53	29	42	26	13	9	5	5	2	1	7	4	25	21	42	32	73	51	405	284
Malaria	2	-	-	-	-	-	5	5	3	-	4	-	9	0	0	1	1	1	3	2	2	2	2	-	36	1
Measles	2355	16	3553	20	4055	32	4197	27	3355	19	2392	10	939	8	153	3	143	1	250	6	379	6	674	21	22425	168
Mumps	1246	2	1410	2	1159	2	1671	2	830	2	830	2	292	1	90	1	100	1	155	1	167	1	173	-	9431	10
Orbitalmia Neonatorum	156	-	174	2	176	-	134	-	162	2	160	1	133	1	109	1	118	-	3	2	2	1	-	-	1820	-
Pellagra	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	18	10
Pneumonia, Lobar	550	250	546	238	556	213	602	259	471	146	310	122	128	60	89	45	103	58	209	134	404	169	494	237	4552	1931
Rabies	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1
Scarlet Fever	2082	19	2076	15	2100	25	1719	23	1447	15	911	12	381	9	237	1	387	5	742	5	937	12	1411	12	14410	157
Septic Sore Throat	14	8	15	1	48	8	17	-	3	3	4	3	12	8	10	2	7	-	9	2	8	2	18	4	170	47
Smallpox	2	1	2	1	1	1	-	-	3	2	2	2	-	-	-	-	-	-	-	-	-	-	-	-	12	2
Syphilis	206	17	189	13	237	18	208	11	177	16	162	14	164	15	205	11	211	16	195	9	184	22	187	13	2325	175
Tetanus	2	2	2	2	3	2	2	2	5	2	8	1	7	3	1	2	3	3	6	6	6	6	2	3	41	23
Trachoma	3	1	9	-	3	-	-	-	6	-	8	-	2	1	2	2	3	-	3	1	5	-	2	-	55	-
Tuberculosis, Pulmonary	15	1	1	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	40	1
Tuberculosis, Other	470	262	418	233	484	277	481	294	553	292	450	287	477	246	405	244	436	228	446	213	394	188	362	211	5378	2975
Typhoid Fever	66	55	78	52	79	45	122	55	101	55	86	45	78	43	65	41	61	44	74	34	69	44	73	32	946	545
Whooping Cough	31	4	31	5	23	4	30	6	44	4	36	8	49	5	251	7	80	7	63	11	43	5	67	3	568	68
	547	21	461	24	422	10	394	11	378	11	223	8	261	17	-	11	222	10	231	10	305	4	367	8	4062	145

Index to Line Numbers in the Table of Cases and Deaths from Diseases Dangerous to the Public Health, 1924.

Abington	111	Dunstable	330	Leyden	334
Acton	192	Duxbury	251	Lincoln	278
Acushnet	136			Littleton	240
Adams	64	East Bridgewater	150	Longmeadow	145
Agawam	118	East Brookfield	277	Lowell	9
Alford	345	East Longmeadow	165	Ludlow	80
Amesbury	68	Eastham	324	Lunenburg	211
Amherst	117	Easthampton	65	Lynn	12
Andover	81	Easton	121	Lynnfield	250
Arlington	37	Edgartown	260		
Ashburnham	200	Egremont	336	Malden	21
Ashby	290	Enfield	289	Manchester	198
Ashfield	288	Erving	228	Mansfield	99
Ashland	171	Essex	242	Marblehead	96
Athol	77	Everett	27	Marion	262
Attleboro	42			Marlborough	55
Auburn	128	Fairhaven	84	Marshfield	254
Avon	190	Fall River	10	Mashpee	346
Ayer	148	Falmouth	153	Mattapoisett	252
		Fitchburg	28	Maynard	94
Barnstable	124	Florida	357	Medfield	141
Barre	151	Foxborough	127	Medford	24
Becket	308	Framingham	47	Medway	156
Bedford	235	Franklin	101	Melrose	44
Belchertown	196	Freetown	229	Mendon	275
Bellingham	186			Merrimac	187
Belmont	59	Gardner	49	Methuen	51
Berkley	279	Gay Head	361	Middleborough	83
Berlin	281	Georgetown	201	Middlefield	343
Bernardston	291	Gill	285	Middleton	264
Beverly	39	Gloucester	41	Millford	60
Billerica	131	Goshen	358	Millbury	109
Blackstone	140	Gosnold	362	Millis	218
Blandford	322	Grafton	91	Millville	178
Bolton	300	Granby	294	Milton	75
Boston	3	Granville	307	Monroe	363
Bourne	180	Great Barrington	108	Monson	125
Boxborough	340	Greenfield	46	Montague	93
Boxford	314	Greenwich	323	Monterey	349
Boylston	286	Groton	197	Montgomery	344
Braintree	66	Groveland	160	Mount Washington	365
Brewster	302				
Bridgewater	88	Hadley	161	Nahant	248
Brimfield	299	Halifax	313	Nantucket	176
Brockton	16	Hamilton	219	Natick	72
Brookfield	221	Hampden	303	Needham	92
Brookline	30	Hancock	319	New Ashford	360
Buckland	234	Hanover	173	New Bedford	8
Burlington	272	Hanson	199	New Braintree	331
		Hardwick	170	New Marlborough	274
Cambridge	11	Harvard	149	New Salem	320
Canton	104	Harwich	217	Newbury	263
Carlisle	316	Hatfield	167	Newburyport	53
Carver	321	Haverhill	18	Newton	22
Charlemont	296	Hawley	328	Norfolk	266
Charlton	205	Heath	339	North Adams	36
Chatham	207	Hingham	110	North Andover	100
Chelmsford	105	Hinsdale	280	North Attleborough	78
Chelsea	26	Holbrook	147	North Brookfield	181
Cheshire	226	Holden	146	North Reading	243
Chester	247	Holland	359	Northampton	38
Chesterfield	332	Holliston	17	Northborough	209
Chicopee	29	Holyoke	162	Northbridge	69
Chilmark	353	Hopedale	195	Northfield	208
Clarksburg	255	Hopkinton	273	Norton	189
Clinton	63	Hubbardston	82	Norwell	256
Cohasset	174	Hudson	244	Norwood	57
Colrain	220	Hull	325		
Concord	103	Huntington		Oak Bluffs	283
Conway	292			Oakham	317
Cummington	325	Ipswich	106	Orange	119
		Kingston	177	Orleans	282
Dalton	139			Otis	338
Dana	312	Lakeville	236	Oxford	130
Danvers	70	Lancaster	182		
Dartmouth	90	Lanesborough	271	Palmer	74
Dedham	73	Lawrence	15	Paxton	309
Deerfield	163	Lee	135	Peabody	43
Dennis	231	Leicester	134	Pelham	310
Dighton	168	Lenox	184	Pembroke	232
Douglas	191	Leominster	40	Pepperell	194
Dover	293	Leverett	301	Peru	364
Dracut	102	Lexington	95	Petersham	305
Dudley	154				

Phillipston	333	Somerset	138	Warwick	355
Pittsfield	25	Somerville	14	Washington	351
Plainfield	337	South Hadley	114	Watertown	34
Plainville	239	Southampton	297	Wayland	204
Plymouth	62	Southborough	206	Webster	58
Plympton	329	Southbridge	56	Wellesley	107
Prescott	354	Southwick	270	Wellfleet	295
Princeton	304	Spencer	113	Wendell	335
Provincetown	129	Springfield	6	Wenham	259
		Sterling	253	West Boylston	203
Quincy	19	Stockbridge	212	West Bridgewater	155
		Stoneham	85	West Brookfield	245
Randolph	123	Stoughton	98	West Newbury	222
Raynham	215	Stow	265	West Springfield	54
Reading	86	Sturbridge	216	West Stockbridge	284
Rehoboth	202	Sudbury	268	West Tisbury	341
Revere	32	Sunderland	241	Westborough	116
Richmond	306	Sutton	183	Westfield	45
Rochester	276	Swampscott	79	Westford	143
Rockland	87	Swansea	193	Westhampton	347
Rockport	142			Westminster	261
Rowe	342	Taunton	31	Weston	188
Rowley	269	Templeton	133	Westport	159
Royalston	287	Tewksbury	132	Westwood	246
Russell	233	Tisbury	249	Weymouth	52
Rutland	214	Tolland	356	Whately	238
		Topsfield	298	Whitman	97
Salem	23	Townsend	237	Wilbraham	157
Salisbury	210	Truro	315	Williamsburg	213
Sandisfield	326	Tyngsborough	258	Williamstown	144
Sandwich	227	Tyringham	350	Wilmington	164
Saugus	67			Winchendon	112
Savoy	327	Upton	223	Winchester	71
Scituate	179	Uxbridge	115	Windsor	318
Seekonk	158			Winthrop	48
Sharon	175	Wakefield	61	Woburn	50
Sheffield	257	Wales	311	Worcester	5
Shelburne	230	Walpole	120	Worthington	348
Sherborn	224	Waltham	33	Wrentham	152
Shirley	185	Ware	89		
Shrewsbury	126	Wareham	137	Yarmouth	267
Shutesbury	352	Warren	166	Tewksbury State Infirmary	366

Cases and Deaths from Diseases Dangerous

Line No.	CITIES AND TOWNS GROUPED IN ORDER OF POPULATION.	Population estimated as of July 1, 1924.	22 An- terior Poli- mye- litis.		25A Chicken Pox.		10 Diph- theria.		24 Ep. Cere- bro- spinal Menin- gitis.		25B Ger- man Mea- sles.		40 Gonor- rhea.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
1	Massachusetts	4,003,030	277	27	8985	8	7290	523	128	42	1644	2	5241	11
2	CITIES OF OVER 500,000.													
3	Boston	750,544	56	6	1882	3	2256	168	26	19	183	-	2448	1
4	CITIES OVER 150,000.	350,768	22	1	696	1	608	67	4	3	318	-	608	1
5	Worcester	195,913	19	1	463	1	432	42	2	2	123	-	326	1
6	Springfield	154,855	3	-	233	-	176	25	2	1	195	-	182	-
7	CITIES, 100,000-150,000.	578,779	59	3	1076	1	793	58	29	8	536	2	695	2
8	New Bedford	132,251	3	-	138	1	128	14	3	2	11	-	69	-
9	Lowell	117,286	15	1	111	-	113	10	4	2	3	-	131	-
10	Fall River	116,408	27	1	141	-	192	18	5	2	186	2	121	1
11	Cambridge	110,518	8	1	630	-	232	9	10	1	324	-	162	-
12	Lynn	102,316	6	-	56	-	128	7	7	1	12	-	112	1
13	CITIES, 50,000-100,000.	439,482	23	-	861	-	1135	79	13	2	166	-	369	2
14	Somerville	99,000	8	-	97	-	195	15	1	-	39	-	94	-
15	Lawrence	98,068	2	-	201	-	231	31	8	1	1	-	111	-
16	Brookton	70,011	2	-	190	-	244	8	1	1	11	-	15	1
17	Holyoke	59,622	2	-	26	-	113	9	1	-	6	-	33	1
18	Haverhill	58,083	4	-	201	-	221	10	-	-	22	-	94	-
19	Quincy	54,698	4	-	146	-	131	6	2	-	87	-	22	-
20	CITIES AND TOWNS, 25,000-50,000.	676,167	36	6	1023	1	1018	62	13	5	139	-	644	1
21	Malden	49,288	2	-	83	-	176	12	3	-	31	-	30	-
22	Newton	48,840	3	-	229	-	25	2	-	1	31	-	26	-
23	Salem	47,578	3	1	60	-	68	8	1	-	4	-	50	-
24	Medford	47,116	6	2	100	-	74	3	-	-	17	-	37	-
25	Pittsfield	43,806	-	-	37	-	101	3	-	-	6	-	37	-
26	Chelsea	42,955	1	-	57	-	106	3	-	-	3	-	228	-
27	Everett	42,397	6	-	70	-	84	1	3	1	10	-	32	-
28	Fitchburg	42,330	3	-	27	-	59	8	-	-	-	-	21	1
29	Chicopee	41,970	1	-	22	1	73	10	-	-	10	-	8	-
30	Brookline	41,780	3	1	120	-	15	-	1	-	19	-	30	-
31	Taunton	38,060	1	1	-	-	10	-	1	-	2	-	76	-
32	Revere	32,275	3	1	-	-	104	2	1	1	-	-	43	-
33	Waltham	31,635	1	-	193	-	70	9	1	1	6	-	12	-
34	Watertown	26,137	3	-	25	-	53	1	2	1	-	-	14	-
35	CITIES AND TOWNS, 10,000-25,000.	621,972	27	3	1833	2	849	56	25	2	169	-	315	1
36	North Adams	22,516	-	-	10	-	6	2	1	-	-	-	-	-
37	Arlington	22,242	2	-	48	-	25	1	-	-	15	-	14	-
38	Northampton	22,230	1	1	78	-	5	1	2	-	26	-	24	-
39	Beverly	22,183	-	-	38	-	1	-	1	1	10	-	5	-
40	Leominster	21,733	2	-	-	-	31	2	1	-	1	-	8	-
41	Gloucester	21,498	1	-	5	-	100	8	1	-	-	-	7	-
42	Attleboro	20,915	2	-	85	-	6	1	2	-	3	-	8	-
43	Peabody	20,430	-	-	49	-	53	6	1	-	3	-	19	-
44	Melrose	19,459	-	-	47	-	27	-	-	-	6	-	6	-
45	Westfield	18,788	-	-	19	-	21	-	1	-	-	-	7	-
46	Greenfield	18,157	-	-	91	-	11	2	1	-	5	-	7	-
47	Framingham	18,144	1	-	225	-	14	1	2	-	-	-	7	-
48	Winthrop	18,011	2	1	36	-	37	-	-	-	8	-	9	-
49	Gardner	17,534	1	-	48	-	6	2	3	-	-	-	38	-
50	Woburn	16,727	-	-	23	-	19	2	1	-	-	-	9	-
51	Methuen	16,309	1	-	96	-	28	3	-	-	-	-	5	-
52	Weymouth	16,088	2	-	16	-	13	-	-	-	1	-	4	-
53	Newburyport	15,910	-	-	60	-	37	5	-	-	3	-	9	-
54	West Springfield	15,436	-	-	15	-	9	1	2	-	-	-	16	-
55	Marlborough	14,817	-	-	29	-	70	1	-	-	-	-	5	-
56	Southbridge	14,272	1	1	5	1	9	1	-	-	-	-	5	-
57	Norwood	14,189	-	-	21	-	31	-	-	-	5	-	3	-
58	Webster	13,915	3	-	8	-	14	-	1	-	-	-	2	-
59	Belmont	13,278	-	-	118	-	12	-	-	-	39	-	5	-
60	Milford	13,269	1	-	20	-	3	-	-	-	3	-	4	-
61	Wakefield	13,255	1	-	36	1	30	1	-	-	3	-	13	-
62	Plymouth	13,158	-	-	17	-	15	1	1	1	1	-	2	-
63	Clinton	12,777	-	-	24	-	45	3	1	-	-	-	5	-
64	Adams	12,729	-	-	10	-	10	-	-	-	7	-	10	1
65	Easthampton	12,602	1	-	5	-	6	1	-	-	2	-	1	-
66	Braintree	11,750	1	-	43	-	19	1	-	-	3	-	6	-
67	Saugus	11,486	-	-	28	-	17	2	-	-	-	-	4	-
68	Amesbury	11,449	-	-	25	-	53	5	1	-	1	-	17	-
69	Northbridge	11,047	2	-	22	-	17	1	-	-	-	-	3	-
70	Danvers	11,045	-	-	10	-	2	-	-	-	-	-	3	-
71	Winchester	10,940	1	-	214	-	19	-	-	-	5	-	5	-
72	Natick	10,705	-	-	27	-	5	1	-	-	-	-	10	-
73	Dedham	10,554	1	-	11	-	8	-	-	-	11	-	8	-
74	Palmer	10,301	-	-	8	-	7	1	-	-	1	-	-	-
75	Milton	10,124	-	-	163	-	8	-	1	-	7	-	2	-

to the Public Health, 1924.

11		101		7		13		40A		8		38		31, 37 37A, 37B		32-36E		1		9		Line No.
Influenza.		Lobar Pneumonia.		Measles.		Mumps.		Ophthalmia Neonatorum. ¹		Scarlet Fever.		Syphilis.		Tuberculosis, Pulmonary.		Tuberculosis, Other Forms.		Typhoid Fever.		Whooping Cough.		
Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	
405	284	4552	1931	22425	168	9431	10	1820	-	14410	157	2325	175	5376	2975	946	545	566	68	4062	145	1
134	30	1530	482	4748	44	727	-	694	-	3600	51	1016	58	1685	670	284	114	77	15	641	21	2
42	16	413	150	1600	13	1196	-	231	-	1474	22	247	19	394	201	71	47	31	3	346	8	3
20	5	239	87	238	2	877	-	193	-	660	17	139	15	263	139	37	25	22	1	238	5	4
22	11	174	63	1362	11	319	-	38	-	814	5	108	4	131	62	34	22	9	2	108	3	5
55	44	621	221	1664	5	1180	1	354	-	1302	7	239	11	862	453	219	100	82	16	681	39	7
2	16	111	38	138	2	138	-	155	-	135	-	63	5	184	93	117	25	18	5	102	7	8
7	4	64	35	201	1	80	-	23	-	134	1	51	-	153	92	31	23	14	2	33	5	9
25	8	128	52	148	-	86	-	128	-	261	2	28	2	212	94	14	19	19	1	324	21	10
20	3	216	49	778	2	783	-	36	-	570	1	59	2	163	122	34	20	17	5	74	1	11
1	13	102	47	299	-	93	1	12	-	202	3	38	2	150	52	23	13	14	3	148	5	12
42	39	432	166	1899	14	379	-	210	-	1145	5	179	14	476	195	90	59	49	6	537	23	13
6	3	161	49	486	-	69	-	27	-	396	2	20	5	103	36	21	11	10	1	44	3	14
9	9	65	25	216	6	119	-	8	-	132	1	86	1	93	53	21	16	20	3	132	7	15
1	1	5	53	23	1	123	-	149	-	259	-	8	2	88	22	10	5	1	-	100	1	16
1	9	30	28	297	6	13	-	1	-	46	1	26	3	69	44	3	13	7	-	32	7	17
9	5	86	18	65	-	23	-	22	-	146	1	32	3	46	22	10	6	4	2	144	3	18
16	8	37	23	791	1	32	-	3	-	166	-	7	-	77	18	25	8	7	-	85	2	19
28	28	613	288	4272	38	1193	1	155	-	2526	38	318	18	668	295	96	73	144	10	471	18	20
2	2	47	24	208	2	84	-	20	-	335	9	1	-	53	24	6	5	13	-	42	2	21
-	2	51	23	1067	1	488	-	27	-	116	-	7	1	37	15	5	3	11	2	109	2	22
2	2	53	19	122	2	187	-	2	-	191	1	14	3	50	26	8	9	4	-	19	1	23
4	3	39	26	375	1	101	-	11	-	273	1	4	-	45	13	8	1	9	-	29	-	24
4	4	27	20	105	3	7	-	3	-	269	9	16	2	64	24	4	5	30	1	49	4	25
-	-	103	36	249	4	61	-	37	-	90	1	195	4	75	39	5	3	26	-	-	-	26
6	1	89	24	212	4	53	-	11	-	167	1	14	-	49	13	8	5	13	1	21	-	27
-	2	40	24	476	3	15	-	4	-	390	4	10	1	39	32	12	4	14	3	20	1	28
-	3	25	8	292	10	21	-	3	-	113	1	3	-	61	34	13	11	2	-	31	6	29
1	3	33	13	416	-	121	-	1	-	137	3	4	1	45	12	11	8	5	1	31	-	30
4	5	42	35	-	2	15	1	4	-	43	-	32	3	51	28	5	8	4	-	4	2	31
-	-	7	13	-	1	-	-	2	-	65	-	8	1	23	8	-	1	2	-	1	-	32
2	1	34	15	679	4	26	-	6	-	149	3	4	2	45	17	8	8	6	1	51	-	33
1	1	-	23	8	71	1	14	-	4	188	5	6	-	31	8	3	2	5	1	15	-	34
79	56	565	280	4085	20	2311	3	41	-	2495	16	91	38	605	372	85	78	105	11	491	16	35
3	3	8	7	164	1	5	-	2	-	12	-	4	-	13	6	3	3	3	2	-	1	36
3	2	33	14	85	-	-	-	1	-	59	-	2	-	25	9	3	4	-	-	18	-	37
5	4	23	11	365	1	384	-	1	-	27	-	9	30	29	41	2	2	8	-	-	-	38
-	1	41	11	418	-	22	-	-	-	118	-	3	-	18	13	2	1	1	1	12	-	39
-	-	25	11	45	-	9	-	-	-	400	3	5	-	41	8	1	3	5	-	4	3	40
-	2	13	8	91	2	1	-	-	-	103	1	4	1	39	3	1	2	5	-	-	-	41
5	5	13	7	40	-	152	-	3	-	51	-	1	1	34	35	3	5	3	-	69	3	42
3	3	17	6	153	1	34	-	1	-	96	1	6	-	20	5	5	3	1	1	-	-	43
1	2	25	11	18	-	46	-	3	-	144	2	1	-	14	4	7	3	1	-	7	-	44
1	1	17	11	23	-	71	1	-	-	110	3	2	-	12	16	1	4	2	1	3	-	45
3	1	13	3	598	4	180	-	4	-	85	-	4	-	11	6	-	-	-	-	20	-	46
1	1	9	13	142	1	6	-	-	-	70	-	5	1	26	11	1	4	-	-	1	-	47
-	-	14	4	34	-	232	-	1	-	104	-	2	-	8	4	-	1	1	-	22	-	48
-	-	10	2	29	1	405	1	4	-	32	-	7	-	33	17	2	5	10	-	6	-	49
2	1	9	9	88	1	23	-	1	-	33	-	2	1	7	10	1	2	1	-	10	2	50
-	-	8	4	17	-	19	-	2	-	99	-	2	-	23	11	5	2	3	-	71	3	51
1	2	7	10	88	-	3	-	1	-	86	-	1	-	12	5	1	-	1	-	5	-	52
-	-	10	6	2	-	60	-	1	-	15	-	3	-	6	6	2	1	2	-	29	-	53
-	1	14	10	79	-	44	-	-	-	46	1	5	-	8	3	1	1	1	-	5	-	54
1	2	12	10	135	1	2	-	-	-	43	-	2	-	18	7	2	2	5	1	7	-	55
-	-	13	6	5	-	25	-	-	-	23	-	2	-	11	4	3	2	2	-	3	1	56
-	1	38	12	11	-	-	-	2	-	96	-	2	-	15	3	3	1	1	-	5	-	57
-	1	2	2	156	-	9	-	3	-	30	1	2	-	16	7	5	2	1	1	2	-	58
-	-	15	3	35	-	44	-	1	-	75	-	1	-	11	5	-	1	3	-	80	-	59
1	2	16	12	41	2	37	-	-	-	46	-	2	-	11	8	4	6	-	-	11	-	60
-	2	17	6	138	-	31	-	1	-	59	1	1	-	9	7	1	1	7	-	18	-	61
-	4	14	8	175	2	130	-	-	-	19	-	4	-	13	4	4	-	5	2	-	-	62
-	1	14	10	105	-	18	-	1	-	64	1	2	1	10	1	4	4	1	1	4	-	63
4	5	15	5	10	-	9	-	2	-	7	-	2	-	14	4	1	1	1	1	-	-	64
-	1	23	2	244	-	47	-	-	-	41	1	-	-	8	4	5	3	1	-	-	-	65
1	2	4	4	29	1	56	-	2	-	12	1	1	-	12	49	-	2	2	-	2	-	66
36	1	18	4	38	-	75	1	-	-	42	-	1	-	8	3	-	3	2	-	4	-	67
1	2	6	2	1	-	7	-	1	-	41	-	1	-	7	5	1	1	3	-	25	1	68
5	2	6	2	1	-	2	-	-	-	24	-	-	-	3	4	-	-	-	-	1	-	69
-	-	13	9	34	1	15	-	1	-	15	-	-	2	17	26	1	2	-	-	10	2	70
-	-	7	6	13	1	24	-	1	-	46	-	-	-	9	2	1	1	-	-	16	-	71
-	2	13	10	132	1	69	-	2	-	22	-	-	1	7	5	1	1	3	-	4	-	72
-	-	-	4	17	-	5	-	1	-	66	-	-	-	5	5	3	1	1	1	4	-	73
-	1	4	3	92	-	-	-	-	-	-	-	-	-	11	3	-	-	7	-	1	-	74
-	-	6	3	194	-	8	-	-	-	34	-	1	-	11	3	1	1	-	-	4	-	75

¹ Includes suppurative conjunctivitis.

Cases and Deaths from Diseases Dangerous

Line No.	CITIES AND TOWNS GROUPED IN ORDER OF POPULATION.	Popu- lation esti- mated as of July 1, 1924.	22 An- terior Poli- mye- litis.		25A Chicken Pox.		10 Diph- theria.		24 Ep. Cere- bro- spinal Mening- itis.		25B Ger- man Meas- les.		40 Gonor- rhea.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
76	Towns, 5,000-10,000.	311,860	29	3	696	-	305	9	14	2	35	-	171	1
77	Athol	9,801	-	-	3	-	2	-	-	-	-	-	3	-
78	North Attleborough	9,085	-	-	16	-	2	-	-	-	-	-	10	-
79	Swampscott	8,817	2	1	7	-	6	-	-	-	-	-	2	-
80	Ludlow	8,626	-	-	5	-	9	-	-	-	-	-	2	-
81	Andover	8,543	-	-	73	-	2	-	1	-	2	-	3	-
82	Hudson	8,412	1	-	1	-	15	-	2	-	-	-	1	-
83	Middleborough	8,286	1	-	36	-	44	-	-	-	-	-	3	-
84	Fairhaven	8,250	-	-	34	-	9	2	-	-	1	-	-	-
85	Stoneham	8,237	-	-	7	-	15	-	1	-	1	-	2	-
86	Reading	8,038	3	1	4	-	9	-	-	-	-	-	4	-
87	Rockland	7,989	2	-	-	-	7	-	-	-	-	-	-	-
88	Bridgewater	7,943	-	-	17	-	7	-	-	-	1	-	22	-
89	Ware	7,747	-	-	-	-	12	1	-	-	-	-	2	-
90	Dartmouth	7,595	-	-	23	-	10	-	1	-	1	-	-	-
91	Grafton	7,490	-	-	-	-	2	1	-	-	-	-	-	-
92	Needham	7,457	-	-	35	-	4	-	-	-	1	-	3	-
93	Montague	7,437	-	-	-	-	1	-	1	-	-	-	4	-
94	Maynard	7,383	-	-	-	-	3	1	1	-	-	-	-	-
95	Lexington	7,119	1	-	151	-	7	1	1	-	2	-	4	-
96	Marblehead	7,058	3	1	7	-	5	1	1	-	-	-	7	-
97	Whitman	6,796	1	-	-	-	2	-	-	-	-	-	6	-
98	Stoughton	6,753	1	-	6	-	8	-	-	-	-	-	-	-
99	Mansfield	6,714	-	-	12	-	3	-	-	-	-	-	8	-
100	North Andover	6,557	-	-	10	-	1	-	1	1	1	-	-	-
101	Franklin	6,551	4	-	34	-	3	-	1	-	3	-	5	-
102	Dracut	6,472	-	-	2	-	1	-	-	-	-	-	-	-
103	Concord	6,300	3	-	33	-	5	-	1	-	3	-	34	1
104	Canton	6,251	-	-	12	-	9	-	-	-	2	-	4	-
105	Chelmsford	6,155	1	-	9	-	2	-	-	-	-	-	-	-
106	Ipswich	6,134	1	-	7	-	10	-	-	-	1	-	3	-
107	Wellesley	6,066	-	-	14	-	15	-	-	-	9	-	2	-
108	Great Barrington	6,018	-	-	43	-	-	-	-	-	2	-	4	-
109	Millbury	5,991	1	-	4	-	7	-	2	-	1	-	1	-
110	Hingham	5,924	-	-	19	-	3	-	-	-	-	-	1	-
111	Abington	5,922	-	-	5	-	4	-	-	-	-	-	1	-
112	Winchendon	5,900	-	-	-	-	17	2	-	-	-	-	1	-
113	Spencer	5,871	3	-	17	-	-	-	-	-	-	-	-	-
114	South Hadley	5,856	-	-	2	-	2	1	-	-	-	-	2	-
115	Uxbridge	5,821	-	-	-	-	12	-	-	-	-	-	9	-
116	Westborough	5,659	-	-	7	-	2	-	-	-	3	-	2	-
117	Amherst	5,542	1	-	16	-	7	-	-	-	1	-	1	-
118	Agawam	5,464	-	-	12	-	3	-	-	-	-	-	2	-
119	Orange	5,406	-	-	5	-	4	-	1	-	-	-	-	-
120	Walpole	5,405	-	-	3	-	5	-	-	-	-	-	12	-
121	Easton	5,019	-	-	5	-	9	-	-	-	-	-	1	-
122	Towns, 2,500-5,000.	168,644	16	2	421	-	180	13	2	-	43	-	61	1
123	Randolph	4,778	-	-	1	-	3	-	-	-	-	-	3	-
124	Barnstable	4,687	3	1	46	-	-	-	1	-	4	-	9	-
125	Monson	4,659	-	-	-	-	1	-	-	-	-	-	-	-
126	Shrewsbury	4,572	-	-	1	-	1	1	-	-	-	-	-	-
127	Foxborough	4,496	-	-	1	-	-	-	-	-	2	-	-	-
128	Auburn	4,467	-	-	45	-	7	1	-	-	-	-	-	-
129	Provincetown	4,201	-	-	5	-	14	2	-	-	-	-	1	-
130	Oxford	4,144	-	-	6	-	1	-	-	-	-	-	3	-
131	Billerica	4,024	-	-	5	-	4	-	-	-	-	-	1	-
132	Tewksbury	4,022	-	-	1	-	2	-	-	-	-	-	-	-
133	Templeton	3,961	-	-	24	-	-	-	-	-	2	-	3	-
134	Leicester	3,800	-	-	-	-	1	-	-	-	-	-	1	-
135	Lee	3,794	-	-	-	-	3	-	-	-	-	-	4	-
136	Acushnet	3,727	-	-	1	-	3	2	-	-	-	-	-	-
137	Wareham	3,695	1	-	4	-	7	1	-	-	-	-	4	-
138	Somerset	3,655	-	-	-	-	2	1	-	-	10	-	-	-
139	Dalton	3,653	-	-	-	-	1	-	-	-	-	-	-	-
140	Blackstone	3,567	-	-	-	-	-	-	-	-	-	-	-	-
141	Medfield	3,546	-	-	1	-	-	-	-	-	1	-	1	-
142	Rockport	3,528	-	-	22	-	6	-	-	-	1	-	-	-
143	Westford	3,480	3	-	17	-	3	-	-	-	-	-	-	-
144	Williamstown	3,446	2	-	6	-	1	-	-	-	3	-	-	-
145	Longmeadow	3,410	-	-	17	-	2	-	-	-	-	-	-	-
146	Holden	3,402	2	1	11	-	3	-	-	-	1	-	9	1
147	Holbrook	3,363	-	-	-	-	1	-	-	-	-	-	1	-
148	Ayer	3,309	-	-	8	-	3	-	-	-	-	-	4	-
149	Harvard	3,304	-	-	1	-	-	-	-	-	-	-	-	-
150	East Bridgewater	3,293	-	-	1	-	3	-	1	-	-	-	1	-

to the Public Health, 1924 — Continued.

11		101		7		13		40A		8		38		31, 37 37A, 37B		32-36E		1		9		Line No.
Influenza.		Lobar Pneumonia.		Measles.		Mumps.		Ophthalmia Neonatorum. ¹		Scarlet Fever.		Syphilis.		Tuberculosis, Pulmonary.		Tuberculosis, Other Forms.		Typhoid Fever.		Whooping Cough.		
Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	
14	30	173	123	1350	16	1801	3	41	-	927	11	199	6	281	173	69	34	27	2	359	9	76
-	4	-	-	7	1	3	-	-	-	22	1	-	-	2	2	5	2	-	-	-	-	77
-	1	5	10	-	22	1	3	-	-	14	1	2	-	12	3	2	1	-	-	-	-	78
-	2	1	6	154	3	40	1	-	-	75	-	-	-	3	3	-	-	-	-	-	-	79
1	2	6	1	13	36	-	-	-	-	10	-	1	-	8	7	-	-	-	-	-	-	80
1	1	4	3	72	5	-	-	3	-	45	-	2	-	3	6	-	-	-	-	6	-	81
-	-	21	5	3	180	-	-	-	-	47	1	1	-	5	5	2	1	3	-	2	1	82
-	-	10	2	12	37	-	-	1	-	28	-	1	-	7	5	-	-	-	-	69	1	83
-	-	11	3	96	48	-	-	-	-	32	-	4	-	23	5	2	1	1	-	17	3	84
-	-	1	2	2	-	-	-	-	-	7	-	-	-	3	6	-	1	-	-	6	-	85
-	-	3	3	2	-	-	-	-	-	28	-	-	-	4	6	-	-	1	-	-	2	86
1	1	13	4	3	47	-	-	-	-	5	1	-	-	9	4	-	-	-	7	-	-	87
-	-	7	2	10	6	-	-	1	-	27	1	109	1	27	10	5	4	-	3	-	-	88
-	-	7	2	10	21	-	-	9	-	17	-	1	2	8	7	1	1	-	-	-	-	89
-	1	1	4	-	-	-	-	-	-	1	-	1	-	16	4	5	1	1	-	46	1	90
-	1	1	4	10	47	-	-	1	-	17	-	-	-	5	2	-	-	-	-	-	-	91
-	-	1	1	68	1	5	1	5	-	7	-	4	-	1	6	-	3	1	-	-	-	92
-	-	-	1	1	-	-	-	-	-	4	-	-	-	8	7	-	-	-	-	-	-	93
-	-	7	3	140	30	-	-	-	-	48	-	-	-	7	4	1	-	1	-	-	-	94
-	-	3	4	74	16	-	-	-	-	38	1	-	-	3	1	-	-	-	-	7	-	95
-	-	3	1	1	-	-	-	-	-	7	-	1	-	4	1	-	-	-	-	-	-	96
-	1	3	1	57	2	-	-	1	-	30	-	2	-	9	2	-	-	-	-	7	-	97
-	1	5	2	2	56	-	-	2	-	31	-	-	-	4	-	4	-	-	-	8	-	98
-	1	2	-	36	1	70	-	-	-	3	-	1	-	2	2	-	1	-	-	-	-	99
1	2	8	3	85	22	-	-	1	-	7	-	-	-	7	4	-	-	-	-	-	-	100
-	-	-	2	1	90	-	-	-	-	8	-	-	-	1	5	-	-	-	-	-	-	101
10	-	3	11	59	2	-	-	2	-	25	-	15	1	10	2	1	1	2	1	40	1	102
1	2	2	2	3	36	-	-	-	-	4	-	-	-	4	3	31	5	1	-	25	-	103
-	2	2	1	6	8	-	-	-	-	3	-	-	-	7	3	-	1	3	-	14	-	104
-	2	2	1	17	-	-	-	-	-	17	-	1	-	6	3	-	1	-	-	1	-	105
-	2	13	5	125	170	-	-	6	-	60	-	2	-	3	1	2	-	2	-	30	-	106
-	1	2	1	3	1	-	-	1	-	64	-	1	-	6	5	2	1	-	-	16	-	107
-	-	3	5	5	12	-	-	-	-	13	-	-	-	8	3	-	1	1	-	7	-	108
-	-	-	1	4	15	-	-	-	-	9	-	-	-	6	-	2	1	-	-	-	-	109
-	-	4	5	9	10	-	-	-	-	4	-	-	-	3	3	-	1	-	-	1	-	110
-	-	4	4	122	7	-	-	-	-	18	-	-	-	1	1	-	1	-	-	3	-	111
-	-	1	1	32	2	2	-	-	-	14	-	2	1	5	5	1	1	1	-	-	-	112
-	1	3	1	1	3	-	-	-	-	2	-	2	1	3	1	-	1	1	-	4	-	113
-	-	-	4	1	8	-	-	-	-	13	1	-	-	1	-	-	2	-	-	-	-	114
-	-	3	3	4	69	-	-	1	-	13	-	36	-	6	9	1	3	-	22	-	-	115
-	1	-	1	3	-	-	-	-	-	31	-	2	-	7	1	2	1	-	-	-	-	116
-	-	2	2	36	1	-	-	-	-	5	2	1	-	3	3	-	-	-	-	3	-	117
-	-	2	2	-	2	-	-	-	-	8	-	8	-	1	1	-	-	-	-	-	-	118
-	-	3	1	14	8	-	-	-	-	10	-	1	-	6	3	-	-	-	-	4	-	119
5	24	92	82	950	11	485	7	-	-	447	3	16	4	164	113	18	13	13	3	189	4	120
-	-	2	3	-	115	59	-	1	-	30	-	-	-	6	1	-	2	3	-	-	-	121
-	-	-	3	-	-	-	-	-	-	3	-	-	-	-	6	-	-	-	-	20	-	122
-	-	-	2	3	-	-	-	-	-	18	-	-	-	1	2	1	-	-	-	-	-	123
1	-	3	3	-	9	-	-	-	-	10	-	2	2	5	2	-	1	-	-	-	-	124
-	-	-	2	-	3	-	-	-	-	2	-	-	-	7	1	-	1	-	-	-	-	125
-	-	-	4	-	-	-	-	2	-	31	-	1	-	7	-	-	-	-	-	-	-	126
2	2	-	2	18	1	-	-	-	-	6	-	1	-	4	3	-	-	-	-	4	-	127
-	-	4	-	74	2	17	-	1	-	24	-	-	-	7	5	-	-	-	-	2	-	128
-	-	-	-	29	-	-	-	-	-	1	-	-	-	1	4	-	-	-	-	-	-	129
-	1	3	1	12	37	-	-	-	-	9	1	-	-	3	2	-	-	2	-	1	1	130
-	1	2	2	1	1	-	-	-	-	14	-	-	-	3	2	-	-	-	-	49	1	131
-	1	-	4	7	-	-	-	2	-	12	-	-	-	4	-	-	1	-	-	-	-	132
-	2	1	2	-	1	-	-	-	-	6	-	-	-	9	5	6	-	-	-	7	-	133
-	-	11	2	1	1	-	-	-	-	8	-	1	1	6	3	1	1	-	-	-	-	134
-	3	3	-	-	-	-	-	-	-	9	-	-	-	1	1	1	-	-	-	-	-	135
-	-	5	2	1	-	-	-	-	-	66	1	1	-	4	1	-	1	-	-	1	2	136
-	-	4	6	-	1	-	-	-	-	1	-	-	-	3	3	2	-	-	-	-	-	137
-	1	-	1	2	-	-	-	-	-	2	-	-	-	14	27	-	-	-	-	-	-	138
-	-	-	1	2	24	-	-	-	-	7	-	-	-	2	2	-	1	-	-	5	-	139
-	-	-	3	24	3	-	-	-	-	14	-	1	-	2	5	-	-	-	-	-	-	140
-	-	2	1	80	1	51	-	-	-	9	-	-	-	1	1	-	-	1	1	2	-	141
-	-	4	4	20	48	-	-	-	-	12	-	1	-	5	1	-	-	-	-	3	1	142
-	1	-	-	-	-	-	-	-	-	10	-	-	-	2	3	-	-	-	-	-	-	143
-	-	3	1	86	3	-	-	-	-	4	-	1	-	1	1	-	-	-	-	2	-	144
-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	145
-	-	3	2	-	-	-	-	-	-	12	-	-	-	3	4	-	-	-	-	-	-	146
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	147
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	148
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	149
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	150

¹ Includes suppurative conjunctivitis.

Cases and Deaths from Diseases Dangerous

Line No.	CITIES AND TOWNS GROUPED IN ORDER OF POPULATION.	Popu- lation estimated as of July 1, 1924.	22 An- terior Polio- mye- litis.		25A Chicken Pox.		10 Diph- theria.		24 Ep. Cere- bro- spinal Menin- gitis.		25B Ger- man Meas- les.		40 Gonor- rhea.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
151	Barre	3,245	2	-	11	-	1	-	-	-	-	-	-	-
152	Wrentham	3,181	-	-	49	-	13	2	-	-	-	-	-	-
153	Falmouth	3,104	-	-	44	-	10	-	-	-	-	-	-	-
154	Dudley	3,066	1	-	-	-	9	1	-	-	-	-	-	-
155	West Bridgewater	3,066	-	-	-	-	-	-	-	-	-	-	-	-
156	Medway	3,060	-	-	3	-	-	-	-	-	-	-	-	-
157	Wilbraham	3,023	-	-	-	-	-	-	-	-	-	-	3	-
158	Seekonk	3,020	-	-	-	-	-	-	-	-	-	-	-	-
159	Westport	2,976	1	-	-	-	1	-	-	-	2	-	-	-
160	Groveland	2,907	-	-	10	-	1	-	-	-	-	-	2	-
161	Hadley	2,896	-	-	1	-	3	1	-	-	-	-	1	-
162	Hopedale	2,885	-	-	1	-	5	-	-	-	-	-	-	-
163	Deerfield	2,862	-	-	1	-	3	-	-	-	-	-	2	-
164	Wilmington	2,819	-	-	1	-	3	-	-	-	-	-	1	-
165	East Longmeadow	2,743	-	-	9	-	6	1	-	-	-	-	-	-
166	Warren	2,707	-	-	10	-	-	-	-	-	-	-	-	-
167	Hatfield	2,669	-	-	2	-	1	-	-	-	1	-	-	-
168	Dighton	2,646	1	-	-	-	-	-	-	-	-	-	-	-
169	Holliston	2,630	-	-	18	-	2	-	-	-	-	-	1	-
170	Hardwick	2,603	-	-	3	-	-	-	-	-	16	-	6	-
171	Ashland	2,553	-	-	34	-	-	-	-	-	-	-	-	-
172	TOWNS UNDER 2,500.	205,637	10	2	496	-	190	11	2	1	55	-	66	-
173	Hanover	2,490	-	1	-	-	-	-	-	-	-	-	1	-
174	Cohasset	2,486	-	-	-	-	-	-	-	-	-	-	1	-
175	Sharon	2,467	-	-	-	-	-	-	-	-	-	-	3	-
176	Nantucket	2,446	-	-	9	-	7	2	-	-	-	-	-	-
177	Kingston	2,433	-	-	-	-	2	-	-	-	-	-	-	-
178	Millville	2,427	-	-	-	-	-	-	-	-	-	-	-	-
179	Scituate	2,413	-	-	-	-	3	-	-	-	-	-	2	-
180	Bourne	2,395	1	-	4	-	5	-	-	-	-	-	-	-
181	North Brookfield	2,362	1	-	-	-	-	-	-	-	-	-	-	-
182	Lancaster	2,344	-	-	24	-	4	-	1	-	-	-	2	-
183	Sutton	2,340	-	-	-	-	1	-	-	-	-	-	-	-
184	Lenox	2,285	-	-	14	-	1	-	-	-	-	-	3	-
185	Shirley	2,269	-	-	12	-	12	-	-	-	-	-	1	-
186	Bellingham	2,242	-	1	-	-	4	-	-	-	-	-	-	-
187	Merrimac	2,241	-	-	1	-	-	-	-	-	2	-	3	-
188	Weston	2,224	-	-	44	-	1	-	-	-	-	-	2	-
189	Norton	2,217	-	-	-	-	1	-	-	-	-	-	1	-
190	Avon	2,185	-	-	6	-	2	-	-	-	-	-	-	-
191	Douglas	2,181	-	-	1	-	3	-	-	-	-	-	1	-
192	Acton	2,171	-	-	2	-	2	-	-	-	-	-	-	-
193	Swansea	2,123	-	-	-	-	-	-	-	-	1	-	-	-
194	Pepperell	2,117	1	-	2	-	-	-	-	-	-	-	-	-
195	Hopkinton	2,114	-	-	3	-	-	-	-	-	-	-	1	-
196	Belchertown	2,054	-	-	6	-	16	-	-	-	-	-	-	-
197	Groton	2,046	-	-	-	-	-	-	-	-	-	-	-	-
198	Manchester	2,012	1	-	3	-	7	-	-	-	-	-	2	-
199	Hanson	1,970	-	-	-	-	-	-	-	-	-	-	-	-
200	Ashburnham	1,967	-	-	1	-	-	-	-	-	-	-	2	-
201	Georgetown	1,954	-	-	-	-	1	-	-	-	-	-	1	-
202	Rehoboth	1,912	-	-	-	-	1	-	1	1	-	-	-	-
203	West Boylston	1,912	-	-	-	-	-	-	-	-	-	-	2	-
204	Wayland	1,841	-	-	18	-	-	-	-	-	-	-	2	-
205	Charlton	1,788	-	-	1	-	1	-	-	-	-	-	-	-
206	Southborough	1,780	-	-	-	-	-	-	-	-	-	-	-	-
207	Chatham	1,774	-	-	-	-	-	-	-	-	8	-	-	-
208	Northfield	1,770	-	-	18	-	1	-	-	-	3	-	-	-
209	Northborough	1,712	-	-	-	-	2	-	-	-	-	-	1	-
210	Salisbury	1,687	-	-	1	-	5	-	-	-	-	-	-	-
211	Lunenburg	1,657	-	-	3	-	1	-	-	-	4	-	-	-
212	Stockbridge	1,634	-	-	8	-	-	-	-	-	-	-	-	-
213	Williamsburg	1,628	-	-	2	-	-	-	-	-	-	-	-	-
214	Rutland	1,599	-	-	-	-	-	-	-	-	-	-	-	-
215	Raynham	1,587	-	-	-	-	-	-	-	-	-	-	-	-
216	Sturbridge	1,532	1	-	-	-	-	-	-	-	-	-	-	-
217	Harwich	1,531	-	-	-	-	-	-	-	-	2	-	-	-
218	Millis	1,526	-	-	-	-	-	-	-	-	-	-	2	-
219	Hamilton	1,501	-	-	1	-	3	-	-	-	-	-	-	-
220	Colrain	1,490	-	-	5	-	-	-	-	-	-	-	-	-
221	Brookfield	1,465	-	-	-	-	-	-	-	-	-	-	-	-
222	West Newbury	1,456	-	-	1	-	1	-	-	-	-	-	-	-
223	Upton	1,441	-	-	-	-	3	-	-	-	-	-	1	-
224	Sherborn	1,428	-	-	-	-	-	-	-	-	-	-	1	-
225	Huntington	1,425	-	-	1	-	-	1	-	-	-	-	-	-

to the Public Health, 1924 — Continued.

11		101		7		13		40A		8		38		31, 37 37A, 37B		32-36E		1		9		Line No.
Influenza.		Lobar Pneumonia.		Measles.		Mumps.		Ophthalmia Neonatorum. ¹		Scarlet Fever.		Syphilis.		Tuberculosis, Pulmonary.		Tuberculosis, Other Forms.		Typhoid Fever.		Whooping Cough.		
Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	
-	-	1	3	14	1	17	-	-	-	12	-	-	-	1	2	1	1	-	-	-	-	151
-	-	11	1	12	-	11	-	-	-	5	1	-	-	2	2	1	1	-	-	22	-	152
-	-	2	-	15	-	-	-	-	-	3	-	2	-	7	3	-	-	-	-	7	-	153
-	3	-	-	1	-	2	-	-	-	8	-	1	-	2	2	-	-	-	-	-	-	154
-	3	-	2	32	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	155
-	3	-	2	-	1	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	156
-	1	-	2	-	-	1	-	-	-	2	-	-	-	-	1	-	-	-	-	-	-	157
-	3	-	2	-	-	-	-	-	-	4	-	-	-	1	5	1	-	-	-	-	-	158
-	6	-	2	-	-	12	-	-	-	4	-	-	-	4	2	4	-	-	-	2	-	159
-	1	-	1	4	1	56	-	-	-	1	-	-	-	1	-	-	-	-	-	10	-	160
-	4	-	7	15	-	-	-	-	-	3	-	-	-	2	1	-	-	-	-	-	-	161
-	3	-	3	71	-	18	-	-	-	17	-	-	-	2	-	-	-	-	-	-	-	162
-	-	-	1	33	1	-	-	-	-	13	-	1	-	4	1	-	1	-	-	4	-	163
-	-	-	4	75	-	36	-	-	-	4	-	-	-	4	-	-	-	-	-	36	-	164
-	-	-	2	1	-	-	-	-	-	2	-	-	-	2	1	-	1	-	-	8	-	165
-	1	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	166
-	3	-	1	38	-	2	-	-	-	4	-	-	-	2	2	-	-	-	-	-	-	167
-	-	-	2	42	-	2	-	-	-	6	-	-	-	2	1	-	-	-	-	-	-	168
-	2	-	2	10	-	2	-	-	-	12	-	-	-	1	-	-	-	-	-	-	-	169
2	17	102	125	1854	7	816	2	103	-	9	-	2	-	1	1	-	-	-	-	-	-	170
-	1	-	4	-	-	-	-	1	-	1	4	17	3	206	424	9	21	37	2	346	7	171
-	1	-	1	2	-	-	-	-	-	1	-	-	-	1	2	-	-	-	-	-	1	172
-	-	-	2	100	-	6	-	-	-	7	-	1	-	5	10	-	3	2	-	5	-	173
-	-	-	-	3	-	73	-	-	-	-	-	-	-	-	1	-	1	1	-	-	-	174
-	-	-	2	2	-	-	-	-	-	7	-	1	-	-	-	-	-	-	-	-	-	175
-	1	-	2	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	176
-	-	4	3	43	-	2	-	1	-	3	-	1	-	1	1	-	-	1	-	-	-	177
-	2	-	2	-	-	-	-	-	-	3	-	-	-	11	7	-	-	-	-	4	-	178
-	3	-	1	86	-	17	-	-	-	1	-	-	-	3	-	-	-	-	-	-	-	179
-	1	-	1	1	-	-	-	-	-	10	-	1	-	4	2	2	-	1	-	12	-	180
-	4	-	1	25	-	1	-	-	-	11	-	-	-	1	-	-	3	-	-	3	-	181
-	1	-	1	52	-	6	1	-	-	11	-	-	-	-	1	-	-	-	-	6	-	182
-	-	-	2	1	-	-	-	-	-	11	-	1	-	-	-	-	-	-	-	5	-	183
-	4	-	1	1	-	-	-	-	-	3	-	-	-	2	1	1	-	-	-	-	-	184
-	3	-	1	5	-	22	-	-	-	8	-	-	-	4	2	-	-	-	-	4	-	185
-	-	-	4	2	-	8	-	-	-	13	-	-	-	1	1	-	-	-	-	4	-	186
-	1	-	1	3	-	51	-	-	-	6	-	-	-	3	1	-	-	-	-	2	-	187
1	1	-	1	39	1	15	-	-	-	12	-	-	-	1	1	-	-	1	-	1	-	188
-	-	-	1	74	-	48	-	-	-	3	-	-	-	3	2	-	-	-	-	3	1	189
-	-	-	1	1	-	-	-	-	-	3	-	-	-	2	-	2	-	-	-	1	-	190
-	-	-	2	2	-	-	-	-	-	6	-	-	-	-	1	-	-	-	-	22	-	191
-	-	-	-	-	-	1	-	-	-	11	-	-	-	-	1	-	-	1	-	-	-	192
-	-	-	2	4	-	2	-	-	-	2	-	-	-	9	2	-	2	-	-	-	-	193
-	-	-	14	-	-	-	-	-	-	10	-	-	-	-	-	-	-	-	-	-	-	194
-	1	-	5	7	-	2	-	-	-	5	-	-	-	1	-	-	1	-	-	-	-	195
-	6	-	-	-	-	-	-	1	-	2	-	-	-	18	29	-	2	-	-	2	-	196
-	-	-	1	-	-	-	-	-	-	29	-	-	-	2	-	-	-	-	-	1	-	197
-	1	-	1	-	-	-	-	-	-	1	-	-	-	1	1	-	1	-	-	7	-	198
-	1	-	2	-	-	-	-	-	-	-	-	-	-	6	1	-	-	-	-	-	-	199
-	-	-	1	-	-	3	-	-	-	10	-	1	-	1	2	-	-	-	-	-	-	200
-	-	-	2	-	-	15	-	-	-	1	-	-	-	4	1	-	-	-	-	1	-	201
-	-	-	1	-	-	-	-	-	-	6	1	-	-	1	2	-	-	-	-	-	-	202
-	-	-	-	-	-	-	-	-	-	4	-	-	-	-	-	-	-	-	-	-	-	203
-	-	-	-	25	-	1	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	204
-	1	-	1	72	-	9	-	36	-	1	-	-	-	1	-	-	-	-	-	4	-	205
-	-	-	1	61	-	1	-	-	-	5	1	-	-	-	-	-	-	-	-	-	1	206
-	-	-	1	1	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	207
-	-	-	4	34	-	5	-	-	-	14	1	-	-	1	1	-	-	2	-	1	-	208
-	-	-	-	-	-	-	-	-	-	11	-	-	-	3	1	-	-	1	-	6	-	209
-	-	-	-	51	-	11	-	-	-	11	-	-	-	-	-	-	-	-	-	3	-	210
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	103	-	-	-	-	-	-	211
-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-	212
-	1	-	4	-	-	-	-	-	-	1	-	-	-	-	-	-	1	-	-	-	-	213
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-	214
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	3	-	-	-	-	215
-	1	-	1	11	-	1	-	-	-	-	-	-	-	3	1	-	-	-	-	-	-	216
-	-	-	-	83	-	-	-	-	-	9	-	3	-	-	-	-	-	-	-	-	-	217
-	-	-	1	71	-	10	-	-	-	1	-	-	-	5	1	-	-	-	-	-	-	218
-	-	-	2	19	-	18	-	-	-	2	-	-	-	2	1	-	-	-	-	1	-	219
-	-	-	-	60	1	7	1	-	-	2	-	-	-	-	-	-	-	-	-	3	-	220
-	-	-	1	-	-	-	-	-	-	-	-	1	-	-	2	-	-	-	-	-	-	221
-	-	-	2	19	-	5	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	222
-	-	-	13	-	-	1	-	-	-	1	-	-	-	2	-	-	-	-	-	18	-	223
1	-	1	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	224
-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	225

¹ Includes suppurative conjunctivitis.

Cases and Deaths from Diseases Dangerous

Line No.	CITIES AND TOWNS GROUPED IN ORDER OF POPULATION.	Popu- lation esti- mated as of July 1, 1924.	22 An- terior Poli- omye- litis.		25A Chicken Pox.		10 Diph- theria.		24 Ep. Cere- bro- spinal Menin- gitis.		25B Ger- man Mea- sles.		40 Gonor- rhea.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
226	Cheshire	1,422	-	-	-	-	15	-	-	-	-	-	1	-
227	Sandwich	1,418	-	-	2	-	-	-	-	-	1	-	-	-
228	Erving	1,416	-	-	2	-	4	-	-	-	-	-	-	-
229	Freetown	1,410	-	-	-	-	-	-	-	-	-	-	-	-
230	Shelburne	1,391	-	-	3	-	-	-	-	-	-	-	-	-
231	Dennis	1,386	-	-	-	-	-	-	-	-	3	-	1	-
232	Pembroke	1,376	-	-	-	-	-	-	-	-	-	-	-	-
233	Russell	1,363	-	-	-	-	5	1	-	-	-	-	-	-
234	Buckland	1,361	-	-	-	-	-	-	-	-	-	-	-	-
235	Bedford	1,358	-	-	25	-	-	-	-	-	-	-	-	-
236	Lakeville	1,352	-	-	35	7	1	-	-	-	-	-	1	-
237	Townsend	1,350	-	-	7	-	-	-	-	-	-	-	-	-
238	Whately	1,342	-	-	-	-	2	-	-	-	-	-	-	-
239	Plainville	1,325	-	-	2	-	-	-	-	-	-	-	2	-
240	Littleton	1,302	-	-	1	-	-	-	-	-	-	-	-	-
241	Sunderland	1,298	-	-	-	-	5	1	-	-	-	-	-	-
242	Essex	1,289	-	-	-	-	7	-	-	-	-	-	-	-
243	North Reading	1,281	-	-	3	-	1	-	-	-	-	-	1	-
244	Hull	1,280	-	-	-	-	-	-	-	-	-	-	1	-
245	West Brookfield	1,276	-	-	-	-	-	-	-	-	-	-	-	-
246	Westwood	1,273	-	-	-	-	1	-	-	-	-	-	-	-
247	Chester	1,262	-	-	-	-	3	-	-	-	-	-	-	-
248	Nahant	1,255	2	-	6	-	-	-	-	-	-	-	2	-
249	Tisbury	1,230	-	-	5	-	2	-	-	-	-	-	-	-
250	Lynnfield	1,215	-	-	-	-	1	-	-	-	-	-	-	-
251	Duxbury	1,206	-	-	60	-	-	-	-	-	3	-	-	-
252	Mattapoisett	1,205	-	-	8	-	-	-	-	-	-	-	-	-
253	Sterling	1,201	-	-	1	-	-	-	-	-	-	-	1	-
254	Marshfield	1,197	-	-	-	-	-	-	-	-	-	-	-	-
255	Clarksburg	1,158	-	-	-	-	-	-	-	-	-	-	-	-
256	Norwell	1,145	-	-	25	-	-	-	-	-	1	-	-	-
257	Sheffield	1,120	-	-	9	-	3	-	-	-	-	-	1	-
258	Tyngsborough	1,116	-	-	6	-	-	-	-	-	-	-	-	-
259	Wenham	1,112	1	-	-	-	1	-	-	-	-	-	-	-
260	Edgartown	1,109	-	-	-	-	2	-	-	-	-	-	-	-
261	Westminster	1,105	-	-	-	-	1	-	-	-	-	-	1	-
262	Marion	1,099	-	-	15	-	1	-	-	-	-	-	3	-
263	Newbury	1,093	1	-	-	-	2	1	-	-	-	-	-	-
264	Middleton	1,087	-	-	3	-	-	-	-	-	-	-	-	-
265	Stow	1,078	-	-	-	-	-	-	-	-	-	-	-	-
266	Norfolk	1,056	-	-	2	-	-	-	-	-	1	-	-	-
267	Yarmouth	1,054	-	-	2	-	-	-	-	-	8	-	2	-
268	Sudbury	1,040	-	-	-	-	1	-	-	-	-	-	-	-
269	Rowley	1,033	-	-	-	-	-	-	-	-	-	-	-	-
270	Southwick	1,032	-	-	7	-	-	-	-	-	-	-	2	-
271	Lanesborough	1,022	-	-	-	-	6	-	-	-	-	-	-	-
272	Burlington	1,011	-	-	-	-	1	-	-	-	-	-	-	-
273	Hubbardston	1,009	-	-	-	-	-	-	-	-	-	-	-	-
274	New Marlborough	1,000	-	-	-	-	2	1	-	-	-	-	-	-
275	Mendon	988	-	-	-	-	-	-	-	-	-	-	-	-
276	Rochester	939	-	-	9	-	-	-	-	-	-	-	-	-
277	East Brookfield	900	-	-	-	-	-	-	-	-	-	-	-	-
278	Lincoln	890	-	-	1	-	1	-	-	-	3	-	-	-
279	Berkley	890	-	-	-	-	-	-	-	-	-	-	-	-
280	Hinsdale	885	-	-	-	-	-	-	-	-	-	-	-	-
281	Berlin	872	-	-	1	-	-	-	-	-	-	-	1	-
282	Orleans	868	1	-	23	-	-	-	-	-	3	-	-	-
283	Oak Bluffs	858	-	-	11	-	-	-	-	-	-	-	-	-
284	West Stockbridge	851	-	-	-	-	3	-	-	-	-	-	-	-
285	Gill	812	-	-	-	-	-	-	-	-	-	-	-	-
286	Boylston	803	-	-	-	-	-	-	-	-	-	-	1	-
287	Royalston	779	-	-	-	-	-	-	-	-	-	-	-	-
288	Ashfield	778	-	-	-	-	3	1	-	-	-	-	1	-
289	Enfield	776	-	-	-	-	-	-	-	-	-	-	-	-
290	Ashby	753	-	-	-	-	-	-	-	-	-	-	-	-
291	Bernardston	751	-	-	-	-	-	-	-	-	-	-	-	-
292	Conway	750	-	-	8	-	-	-	-	-	-	-	-	-
293	Dover	741	-	-	-	-	-	-	-	-	-	-	-	-
294	Granby	734	-	-	-	-	-	-	-	-	-	-	-	-
295	Wellfleet	723	-	-	-	-	-	-	-	-	-	-	-	-
296	Charlemont	720	-	-	-	-	-	-	-	-	-	-	-	-
297	Southampton	713	-	-	-	-	-	-	-	-	-	-	-	-
298	Topsfield	700	-	-	-	-	-	-	-	-	-	-	-	-
299	Brimfield	663	-	-	-	-	-	-	-	-	-	-	-	-
300	Bolton	650	-	-	-	-	-	1	-	-	-	-	-	-

to the Public Health, 1924 — Continued.

11		101		7		13		40A		8		38		31, 37, 37A, 37B		32-36E		1		9		Line No.
Influenza.		Lobar Pneumonia.		Measles.		Mumps.		Ophthalmia Neonatorum. ¹		Scarlet Fever.		Syphilis.		Tuberculosis, Pulmonary.		Tuberculosis, Other Forms.		Typhoid Fever.		Whooping Cough.		
Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	
-	-	2	2	-	5	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	226
-	-	1	1	42	-	-	2	-	-	1	-	-	-	6	-	-	-	-	-	3	-	227
-	-	1	1	1	-	-	-	-	1	-	2	-	-	1	-	-	-	-	-	20	-	228
-	1	1	2	3	-	-	-	-	-	-	-	-	-	4	1	-	-	-	-	-	-	229
-	-	2	4	56	2	1	2	-	-	1	1	-	-	1	-	1	-	-	-	-	-	230
-	-	-	-	-	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	231
-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	232
-	-	-	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	233
-	-	2	1	77	-	49	-	-	-	15	-	-	-	1	1	-	-	-	-	-	-	234
-	-	1	3	6	-	4	-	-	-	7	-	1	-	26	80	1	-	-	-	2	-	235
-	-	-	-	5	-	-	-	-	-	12	-	-	-	-	-	-	-	-	-	18	-	236
-	-	-	-	1	-	-	-	-	-	7	-	-	-	-	-	-	-	-	-	-	-	237
-	-	1	2	12	-	1	-	-	-	1	-	-	-	-	-	-	-	1	-	-	-	238
-	-	-	1	26	1	14	-	-	-	2	-	1	-	1	1	-	-	-	-	36	2	239
-	-	-	-	2	-	-	-	-	-	5	-	-	-	1	-	-	-	-	-	-	-	240
-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	241
-	-	-	-	2	-	-	-	-	-	-	-	-	-	3	49	-	-	1	-	-	-	242
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	243
-	-	-	-	4	1	-	7	-	-	-	-	-	-	-	2	-	-	-	-	-	-	244
-	-	-	-	-	-	-	-	-	-	6	-	1	-	1	2	-	-	-	-	-	-	245
-	-	2	-	55	-	-	-	-	-	3	-	-	-	1	1	-	-	-	-	-	-	246
-	-	1	1	1	-	-	-	-	-	2	-	-	-	1	1	1	-	-	-	5	-	247
-	-	-	1	3	-	-	-	-	-	1	-	1	-	1	3	-	-	-	-	-	-	248
-	-	-	-	63	-	58	-	1	-	3	-	-	-	3	-	-	-	1	-	3	-	249
-	-	1	-	3	-	6	-	-	-	18	-	-	-	6	1	2	-	-	-	-	-	250
-	-	1	-	5	-	7	-	-	-	12	-	-	-	3	1	-	-	-	-	4	-	251
-	-	1	-	6	-	61	-	-	-	1	-	1	-	1	-	-	-	-	-	11	-	252
-	-	2	2	1	-	1	-	-	-	2	-	-	-	2	-	-	-	-	-	-	-	253
-	-	1	3	4	-	2	-	-	-	4	-	-	-	-	-	-	-	-	-	-	-	254
-	-	2	1	-	-	-	-	-	-	3	-	-	-	-	1	-	-	-	-	-	-	255
-	-	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	18	1	256
-	-	1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	257
-	-	-	1	4	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	21	-	258
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	259
-	-	2	1	3	-	-	-	-	-	6	-	-	-	4	1	-	-	-	-	-	-	260
-	-	4	3	1	-	19	-	-	-	11	-	-	-	-	-	-	-	-	-	-	-	261
-	1	-	3	1	-	3	-	1	-	5	-	-	-	7	1	1	-	1	-	3	-	262
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-	-	-	-	8	-	-	-	-	-	-	-	-	-	-	68	3	1	-	-	18	-	264
-	-	-	1	1	-	9	-	2	-	8	-	-	-	-	-	-	-	-	-	-	-	265
-	-	-	1	1	-	1	-	1	-	1	-	1	-	-	-	-	-	-	-	-	-	266
-	-	2	3	-	-	1	-	1	-	3	-	-	-	3	-	-	-	-	-	-	-	267
-	-	1	1	1	-	1	-	1	-	2	-	-	-	-	-	-	-	-	-	-	-	268
-	-	-	-	6	-	15	-	1	-	1	-	-	-	1	-	-	-	-	-	-	-	269
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	270
-	-	-	-	-	-	-	-	-	-	4	-	-	-	-	1	-	-	-	-	-	-	271
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	272
-	-	-	-	5	-	-	-	-	-	5	-	-	-	-	-	-	-	-	-	-	-	273
-	-	-	-	2	-	-	-	-	-	4	-	-	-	-	1	-	-	-	-	-	-	274
-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	275
-	-	-	1	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1	-	16	-	276
-	-	2	3	1	-	27	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	277
-	-	-	-	-	-	-	-	-	-	4	-	-	-	-	-	-	-	-	-	-	-	278
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	279
-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	2	-	-	-	-	-	-	280
-	1	2	1	3	-	50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	281
-	-	-	1	3	-	1	-	-	-	-	-	-	-	1	1	-	-	-	-	2	-	282
-	-	-	-	-	-	4	-	-	-	-	-	-	-	2	1	-	-	-	-	-	-	283
-	-	-	-	20	-	-	-	50	-	3	-	-	-	1	1	-	-	-	-	-	1	284
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	285
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-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	299
-	-	-	-	32	-	-	-	-	1	3	-	-	-	1	-	-	-	-	-	-	-	300

¹ Includes suppurative conjunctivitis.

Cases and Deaths from Diseases Dangerous

Line No.	CITIES AND TOWNS GROUPED IN ORDER OF POPULATION.	Popu- lation esti- mated as of July 1, 1924.	22 An- terior Poli- mye- litis.		25A Chicken Pox.		10 Diph- theria.		24 Ep. Cere- bro- spinal Menin- gitis.		25B Ger- man Meas- les.		40 Gonor- rhea.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
301	Leverett	614	-	-	-	-	2	-	-	-	-	-	-	-
302	Brewster	598	-	-	-	-	-	-	-	-	1	-	-	-
303	Hampden	579	-	-	8	-	-	-	-	-	-	-	2	-
304	Princeton	570	-	-	-	-	6	-	-	-	-	-	-	-
305	Petersham	561	-	-	5	-	-	-	-	-	3	-	-	-
306	Richmond	557	-	-	-	-	1	-	-	-	-	-	1	-
307	Granville	534	-	-	-	-	2	-	-	-	-	-	-	-
308	Becket	517	-	-	-	-	-	-	-	-	-	-	-	-
309	Paxton	507	-	-	-	-	-	-	-	-	-	-	-	-
310	Pelham	507	-	-	-	-	-	-	-	-	-	-	-	-
311	Wales	496	-	-	-	-	-	-	-	-	-	-	-	-
312	Dana	491	-	-	-	-	-	-	-	-	-	-	2	-
313	Halifax	491	-	-	-	-	-	-	-	-	-	-	-	-
314	Boxford	471	-	-	-	-	-	-	-	-	-	-	-	-
315	Truro	451	-	-	2	-	-	-	-	-	-	-	-	-
316	Carlisle	436	-	-	-	-	-	-	-	-	-	-	-	-
317	Oakham	432	-	-	-	-	1	-	-	-	-	-	-	-
318	Windsor	430	-	-	-	-	-	-	-	-	-	-	-	-
319	Hancock	419	-	-	-	-	-	-	-	-	-	-	-	-
320	New Salem	404	-	-	-	-	-	-	-	-	-	-	-	-
321	Carver	400	-	-	-	-	-	-	-	-	-	-	-	-
322	Blandford	374	-	-	-	-	-	-	-	-	-	-	-	-
323	Greenwich	372	-	-	-	-	-	-	-	-	2	-	-	-
324	Eastham	370	-	-	5	-	-	-	-	-	-	-	-	-
325	Cummington	363	-	-	-	-	-	-	-	-	-	-	-	-
326	Sandisfield	361	-	-	-	-	-	-	-	-	-	-	-	-
327	Savoy	355	-	-	-	-	-	-	-	-	-	-	-	-
328	Hawley	354	-	-	-	-	-	-	-	-	-	-	-	-
329	Plympton	347	-	-	-	-	-	-	-	-	1	-	-	-
330	Dunstable	344	-	-	-	-	-	-	-	-	-	-	-	-
331	New Braintree	340	-	-	-	-	-	-	-	-	-	-	-	-
332	Chesterfield	329	-	-	-	-	-	-	-	-	-	-	-	-
333	Phillipston	322	-	-	-	-	-	-	-	-	-	-	-	-
334	Leyden	317	-	-	-	-	1	-	-	-	-	-	-	-
335	Wendell	306	-	-	-	-	3	1	-	-	-	-	-	-
336	Egremont	300	-	-	-	-	3	-	-	-	-	-	-	-
337	Plainfield	292	-	-	-	-	-	-	-	-	-	-	-	-
338	Otis	285	-	-	-	-	-	-	-	-	-	-	-	-
339	Heath	271	-	-	-	-	-	-	-	-	-	-	-	-
340	Boxborough	271	-	-	1	-	-	-	-	-	-	-	-	-
341	West Tisbury	255	-	-	-	-	-	-	-	-	-	-	-	-
342	Rowe	247	-	-	-	-	-	-	-	-	-	-	-	-
343	Middlefield	239	-	-	-	-	-	-	-	-	-	-	-	-
344	Montgomery	229	-	-	-	-	3	-	-	-	-	-	-	-
345	Alford	226	-	-	-	-	-	-	-	-	-	-	1	-
346	Mashpee	224	-	-	-	-	-	-	-	-	-	-	-	-
347	Westhampton	214	-	-	-	-	-	-	-	-	-	-	-	-
348	Worthington	211	-	-	-	-	1	-	-	-	-	-	-	-
349	Monterey	210	-	-	-	-	-	-	-	-	-	-	-	-
350	Tyringham	209	-	-	-	-	-	-	-	-	-	-	-	-
351	Washington	208	-	-	-	-	-	-	-	-	-	-	-	-
352	Shutesbury	197	-	-	-	-	-	-	-	-	-	-	-	-
353	Chilmark	195	-	-	-	-	-	-	-	-	-	-	-	-
354	Prescott	190	-	-	-	-	-	-	-	-	5	-	-	-
355	Warwick	187	-	-	-	-	-	-	-	-	-	-	-	-
356	Tolland	187	-	-	-	-	-	-	-	-	-	-	-	-
357	Florida	177	-	-	2	-	-	-	-	-	-	-	-	-
358	Goshen	161	-	-	-	-	-	-	-	-	-	-	-	-
359	Holland	148	-	-	-	-	-	-	-	-	-	-	1	-
360	New Ashford	139	-	-	-	-	-	-	-	-	-	-	-	-
361	Gay Head	117	-	-	-	-	-	-	-	-	-	-	-	-
362	Gosnold	109	-	-	-	-	-	-	-	-	-	-	-	-
363	Monroe	108	-	-	-	-	-	-	-	-	-	-	-	-
364	Peru	104	-	-	-	-	-	-	-	-	-	-	-	-
365	Mt. Washington	51	-	-	-	-	-	-	-	-	-	-	-	-
366	Tewksbury State Infirmary	-	-	-	1	1	-	6	-	-	-	-	64	1

to the Public Health, 1924 — Concluded.

11		101		7		13		40A		7		38		31, 37 37A, 37B		32-36E		1		9		Line No.
Influenza.		Lobar Pneumonia.		Measles.		Mumps.		Ophthalmia Neonatorum. ¹		Scarlet Fever.		Syphilis.		Tuberculosis, Pulmonary.		Tuberculosis, Other Forms.		Typhoid Fever.		Whooping Cough.		
Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	
-	-	6	1	3	-	1	-	-	-	2	-	-	-	1	-	-	-	1	-	-	-	301
-	-	1	2	3	-	2	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	302
-	-	-	-	36	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	303
-	-	2	-	12	-	5	-	-	-	2	-	-	-	1	-	-	-	-	-	-	-	304
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4	-	11	14	3	-	3	-	4	-	-	-	3	5	45	82	5	6	1	-	1	-	366

¹ Includes suppurative conjunctivitis.

In addition to the above there occurred 4 cases of actinomy-cosis, with 2 deaths:

	Cases.	Deaths.
Boston	2	2
Brookline	1	-
Palmer	1	-

11 cases of anthrax, with 1 death:

Boston	2	-
Easton	1	-
Haverhill	1	-
Lowell	1	1
Lynn	2	-
Malden	1	-
Peabody	3	-

208 cases of dog bite (requiring anti-rabic treatment):

Arlington	8	-
Belmont	2	-
Billerica	1	-
Boston	64	-
Cambridge	7	-
Chelmsford	5	-
Chicopee	2	-
Dedham	1	-
Edgartown	1	-
Fall River	2	-
Fitchburg	1	-
Greenfield	1	-
Groveland	2	-
Holliston	1	-
Hudson	7	-
Ipswich	4	-
Lawrence	7	-
Lincoln	1	-
Littleton	2	-
Lowell	48	-
Lynn	1	-
Malden	3	-
Mansfield	1	-
Medford	3	-
Melrose	3	-
Methuen	1	-
Milton	2	-
Newton	1	-
North Adams	3	-
North Andover	2	-
North Attleborough	1	-
Saugus	1	-
Somerville	4	-
Spencer	1	-
Stoneham	3	-
Tyngsborough	2	-
Waltham	1	-
Watertown	1	-
West Brookfield	1	-
Winchester	1	-
Winthrop	4	-
Worcester	1	-

25 cases of dysentery, with 5 deaths:

Boston	17	4
Brookline	1	-
Cambridge	1	-
Everett	2	1
Newburyport	2	-
Stoneham	1	-
Uxbridge	1	-

106 cases of encephalitis lethargica, with 58 deaths:

Arlington	4	1
Attleboro	1	-
Boston	33	16
Cambridge	5	2
Chelsea	3	1
Cheshire	1	1
Chicopee	2	-
Clinton	1	-
Douglas	-	1
Everett	2	1
East Longmeadow	-	1
Fall River	1	1
Haverhill	1	-
Holyoke	1	2
Lawrence	4	3
Lowell	1	1

	Cases.	Deaths.
Lynn	3	1
Malden	3	-
Marblehead	1	1
Medford	2	-
Melrose	5	1
Milford	2	1
Milton	1	-
Nantucket	-	1
New Bedford	2	2
Newburyport	5	3
Newton	1	2
North Attleborough	1	-
Oxford	1	1
Pittsfield	1	-
Somerville	7	2
Springfield	2	1
Stoneham	1	1
Wakefield	1	-
Whitman	-	1
Williamstown	-	2
Worcester	7	7

18 cases of hookworm:

Boston	17	-
Cambridge	1	-

36 cases of malaria, with 1 death:

Belmont	2	-
Beverly	1	-
Boston	10	-
Brockton	2	-
Cambridge	2	-
Chelmsford	1	-
Dedham	1	-
Everett	2	-
Lawrence	1	-
Milford	7	1
New Bedford	1	-
Pittsfield	1	-
Plymouth	1	-
Somerville	1	-
Weymouth	1	-
Worcester	2	-

18 cases of pellagra, with 10 deaths:

Boston	15	7
Cambridge	1	-
Everett	1	-
Newburyport	1	1
Westborough	-	1
Worcester	-	1

1 case of rabies, with 1 death:

Milford	1	1
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170 cases of septic sore throat, with

47 deaths:

Abington	-	1
Belmont	1	1
Boston	78	11
Bourne	1	-
Braintree	1	-
Cambridge	3	2
Clinton	1	1
Danvers	-	1
Dover	14	-
Everett	-	1
Fairhaven	4	1
Fall River	4	2
Falmouth	1	-
Gill	23	-
Haverhill	1	1
Holyoke	2	-
Lawrence	1	1
Leominster	2	1
Lowell	1	1
Lynn	1	-
Medford	3	-
Milton	3	-
Natick	4	1
Needham	1	-
Newton	2	-
North Adams	-	2
New Bedford	3	3
Norwood	1	2
Palmer	-	1
Reading	-	1
Salem	2	1

	Cases.	Deaths.
Somerville	2	-
Southbridge	-	1
Springfield	2	4
Stoneham	1	-
Waltham	-	1
Wareham	-	1
Wellesley	1	-
W. Springfield	2	1
Winthrop	1	-
Worcester	3	3

12 cases of smallpox, with 2 deaths:

Brockton	3	-
Buckland	2	-
Huntington	2	-
Springfield	1	-
Taunton	4	2

41 cases of tetanus with 23 deaths:

Adams	2	1
Beverly	1	1
Boston	12	6
Brookline	-	1
Chelsea	1	-
Gardner	1	1
Haverhill	1	-
Leominster	1	-
Lowell	2	1
Lynn	3	2
Malden	1	-
Methuen	1	-
New Bedford	1	-
Newton	1	-
North Adams	1	-
Northampton	1	1
Norwood	1	-

	Cases.	Deaths.
Peabody	1	1
Pittsfield	-	3
Quincy	1	-
Rochester	-	1
Salem	1	1
Somerville	1	-
Springfield	-	1
Waltham	1	1
Winthrop	1	-
Woburn	1	-
Worcester	3	1

55 cases of trachoma:

Attleboro	1	-
Boston	32	-
Cambridge	3	-
Chelsea	2	-
Easton	1	-
Everett	1	-
Franklin	1	-
Lawrence	1	-
Lowell	3	-
Lynn	1	-
Medford	2	-
Methuen	1	-
Somerville	2	-
Watertown	1	-
Worcester	3	-

40 cases of trichinosis, with 1 death:

Boston	31	1
Cambridge	3	-
Chelsea	1	-
Concord	1	-
Fitchburg	1	-
Worcester	3	-

REPORT OF DIVISION OF BIOLOGIC LABORATORIES.

BENJAMIN WHITE, Ph.D., *Director.*

ELLIOTT S. ROBINSON, M.D., Ph.D., *Assistant Director.*

WILLIAM W. HINTON, M.D., *Assistant Director.*

I. ANTITOXIN AND VACCINE LABORATORY.

1. *Distribution of Products.*

The year just passed is the fifth year of my directorship of the laboratory, and, therefore, I am presenting a table showing the amounts of the various products distributed for the past five years.

PRODUCT.	1920.	1921.	1922.	1923.	1924.
Diphtheria Antitoxin, 1,000 unit doses . . .	218,227	261,024	336,730	411,507	442,905
Antimeningococcic Serum, 15 cc. doses . . .	3,585	3,444	4,296	4,609	3,949
Antipneumococcic Serum, 100 cc. doses . . .	444	649	721	336	335
Smallpox Vaccine Virus, capillary tubes . . .	189,064	197,733	189,215	197,767	249,090
Typhoid-Paratyphoid Vaccine, 1 cc. doses . . .	49,191	55,804	66,959	60,976	65,512
Schick Outfits, 50 doses each . . .	126	547	3,235	5,875	6,427
Diphtheria toxin for Schick test (bulk), cc. . .	—	32	155½	170	140
Diphtheria Toxin-Antitoxin Mixture, 1 cc. doses . . .	3,614	9,414	96,407	174,589	309,294
Normal Serum, cc. . .	—	9,788	4,665	7,670	39,415

The distribution of products during the past year has exceeded the distribution of any previous year in the laboratory's history. New high records have been set for diphtheria antitoxin, smallpox vaccine virus, Schick outfits and diphtheria toxin-antitoxin mixture. The output of diphtheria antitoxin is approximately one hundred per cent greater than it was in 1920, and it should be noted that in producing this amount no more horses were employed for antitoxin production than in 1920.

The same economy is shown in the production of vaccine virus. Here the larger output has been accomplished by using no more calves than formerly. The increased yield has been made possible by improved methods of vaccination.

The remarkable increase in the agents for diphtheria prevention, such as Schick outfits and toxin-antitoxin mixture, is a direct result of the greatly increased interest in diphtheria prevention aroused by the Department's campaign.

The increased prevalence of smallpox throughout the country and its near approach to Massachusetts has caused a greater demand for vaccine virus. The laboratory has already taken steps to augment its stock of vaccine virus in order to meet any unusual demands.

2. *Expenses.*

The total cost of operating this laboratory is shown in the accompanying figures for the five year period.

YEAR.	PERSONAL SERVICES.		EXPENSES.	
	Appropriation.	Spent.	Appropriation.	Spent.
1920	\$23,112	\$23,094 00	\$23,638 15	\$23,742 37
1921	28,760	28,610 41	24,700 00	24,500 46
1922	30,700	30,690 50	29,400 00	29,360 80
1923	35,620	35,229 51	30,002 56	30,001 73
1924	41,000	40,719 18	34,011 50	33,974 03

In this connection, it should be pointed out that the products distributed have been produced for a much smaller sum of money than would be required to purchase these products even under the most advantageous terms, and with the greater production and better organization the proportionate unit cost of the products to the State is steadily decreasing. Better, simpler and less expensive packages have been devised which have resulted in a cost saving of fifty per cent in some instances.

3. *Stocks on Hand.*

Never before has the laboratory had in reserve such large stocks of its various products. There are sufficient amounts of the various serums and vaccines on hand not only to meet any expected increase in demand, but also to meet any

emergency requirements. With the excellent cold storage facilities available, it is possible to keep some of these products for an extended period without appreciable loss of potency.

4. *Improvements.*

The appearance of some of the laboratory rooms has been improved and various equipment has been added which lessens much of the necessary work. A small electric refrigerating apparatus has been installed which affords improved facilities for keeping such perishable products as smallpox vaccine, Schick toxin and Schick outfits. The quarantine stable and necropsy rooms have been put in an excellent state of repair, resulting in greater comfort to the horses.

5. *Personnel.*

With the reorganization of the staff and the consequent standardization and consolidation of duties, it has been possible to manufacture all the products required for the increased distribution with the same staff as formerly. The Director wishes to record here the loyal and conscientious services rendered by members of the staff and other employees.

6. *Educational Activities.*

A. *Teaching.* — The laboratory to a greater degree than ever is now fulfilling one of its main functions, and that is education. A closer relation between both the Harvard Medical School and the Harvard School of Public Health has been effected which is of great benefit to this laboratory. Instruction is given both to classes and individual students from both these schools, and advanced students are now taken at the laboratory where they carry out investigative studies in serum and vaccine production. From a public health standpoint, it is most desirable to instruct medical and public health students in the preparation and use of serums and vaccines, and this function is now being performed by the Director and the Assistant Director in their lectures at the two Harvard schools. Additional instruction is given to groups of medical students and to nurses from other medical schools and hospitals in Boston.

B. *Investigation.* — A number of original investigations have been and still are in progress, some of which have already yielded valuable results. A study of various methods for immunizing horses for the production of diphtheria antitoxin has already shown us how to produce antitoxin of higher potency in a shorter time than previously, and the application of the improved methods has resulted in a much greater yield of antitoxin from the horses. A study has also been made of the Ramon flocculation test and it has been found possible to utilize this test for preliminary titration of antitoxin. The use of this method effects a considerable saving both in time and in money.

C. *Visitors.* — A large number of visitors has been at the laboratory for longer or shorter periods for definite information concerning the various processes in serum and vaccine manufacture. All departments of the laboratory are freely open to such visitors and all data concerning laboratory administration or the production of biologic products is placed freely at the disposal of any persons desiring such information.

D. *Lectures and Addresses.* — In addition to lectures and demonstrations at the laboratory, the Director and the Assistant Director have given lectures on diphtheria prevention, scarlet fever, and other subjects having to do with preventive medicine before medical societies, public health officers, parent-teachers' associations and others. These lectures have been given before audiences totalling 1,837.

E. *Publications.* — The following publications have been issued from this laboratory during the past year:

White, Benjamin: Group Reactions to the Schick test. *Boston Med. and Surg. J.*, Vol. 189, No. 25, pp. 1026-1030, Dec. 20, 1923.

Snyder, Laurence H.: (From the Bussey Institution and the Massachusetts State Antitoxin and Vaccine Laboratory) Iso-Hemagglutinins in Rabbits. *J. Immunology*, Vol. IX, No. 1, January, 1924.

Nye, Robert N.: A Simplified Hydrogen Electrode Vessel. *J. Immunology*, Vol. IX, No. 3, May, 1924.

White, Benjamin and Robinson, Elliott: Effect of Exposure to Low Temperatures on Diphtheria Toxin-Antitoxin Mixture. *J. A. M. A.*, May 24, 1924, Vol. 82, pp. 1675-1678.

White, Benjamin and Nye, Robert N.: A Bacteriological Incubator Room. *J. Lab. and Clin. Med.*, Vol. IX, No. 11, August, 1924.

White, Benjamin: Smallpox and Vaccination. Harvard University Press, Cambridge, 1924.

7. Inspection by U. S. Public Health Service.

The annual inspection of the laboratory, its records, processes and products was duly made by the Inspector from the United States Hygienic Laboratory and the license to produce the products distributed was again reissued.

8. Needs.

A. *Accommodations.*—The demands made for products during the past year have taxed the laboratory to its utmost. The laboratory building, built in 1904, is no longer adequate to house either the personnel or the equipment required to prepare the volume of products that are now demanded. The need, forecasted and more urgently recommended each year is now an acute one, and if the laboratory is merely to meet the present increasing demands, additional accommodations must be supplied. It is also evident that certain other biologic products may soon come into general use, and it will be a proper and necessary function of the State to produce and distribute these products. This anticipated work cannot be carried out with our present building, personnel or equipment, and it, therefore, becomes imperative that plans be made in the very near future to provide accommodations both for laboratory and stable functions which will adequately provide for the new products to be manufactured.

B. *Salaries.*—The salaries paid by the State to the employees of this laboratory are still inadequate. It may be pointed out once again that the majority of the staff must be highly trained persons and that the compensation paid should be sufficient to attract such workers and to retain their services. While a great improvement has already been made in the various salary grades, a further revision upward should be made not only for certain individual positions, but the general scale throughout should be raised, so that we may have a continuing organization.

II. WASSERMANN LABORATORY.

The work of the Wassermann Laboratory for the year 1924 continues to show an increase over that of previous years. Table I shows the routine work performed during the past five years and indicates the extent and the distribution of the tests. It will be noted that the Wassermann examinations have been increased by seven per cent and that Kahn tests and agglutination tests for contagious abortion in cattle have been added to the routine procedures. The total increase in these three tests more than makes up for the slight decrease in some of the other examinations, particularly in that for rabies.

TABLE I.

PRODUCT.	1920.	1921.	1922.	1923.	1924.
Wassermann tests	36,953	42,679	47,488	56,214	60,534
Gonococcus fixation tests	1,726	1,703	1,476	1,542	1,661
Lange's colloidal gold tests	—	82	157	105	88
Diagnostic examinations for the Div. of Animal Industry:					
(a) Complement fixation tests for glanders	221	125	279	145	110
(b) Examinations for rabies	166	277	482	413	283
(c) Pathologic and bacteriologic examinations	64	50	55	34	34
Kahn Precipitation Test	—	—	—	—	2,554
Complement fixation test for <i>Bacillus abortus</i>	—	—	—	—	148
	39,130	44,916	49,937	58,453	65,412

In our report of last year the hope was expressed that the Kahn test might be serviceable in replacing the Wassermann test in those instances where the specimens of blood were received in a hemolyzed condition. This hope has been largely fulfilled. Our experience with this reaction would indicate that it is not quite so reliable as the Wassermann test, particularly in that it seems to give false posi-

tive results occasionally in pregnancy and very infrequently in other cases where the clinical data do not support a diagnosis of syphilis.

Besides the routine activities of the Laboratory, considerable effort has been spent on the investigation of the use of salvarsan as a curative agent in rabies and in attempts to cultivate its virus. Also, some experimental work is being carried on with the hope of learning more about the nature of the anti-bodies in those complement fixation tests which are being routinely made in this laboratory. Besides these accomplishments in investigation, statistical data have been assembled on the incidence of positive, doubtful and negative Wassermann reactions in cancerous, tuberculous and feeble-minded individuals.

The esprit de corps of the laboratory during the past year has been exceptionally fine, resulting in increased efficiency and economy. The latter has been demonstrated by a total increase of nearly twelve per cent in the number of examinations on a total expenditure of seven per cent over that of last year.

REPORT OF THE DIVISION OF HYGIENE.

MERRILL E. CHAMPION, M.D., *Director.*

MARY R. LAKEMAN, M.D., *Assistant Director.*

The work of the Division of Hygiene for the year 1924 will be discussed under six headings:

- | | |
|---------------------------------|------------------------------------|
| (1) Maternal and Infant Hygiene | (4) Nutrition |
| (2) School Hygiene | (5) Health Education and Publicity |
| (3) Mouth Hygiene | (6) Miscellaneous Activities. |

MATERNAL AND INFANT HYGIENE.

Study of Maternal Deaths. — Two years ago when a separate appropriation was made by the legislature for the promotion of maternal and infant hygiene, one of the first things undertaken was a study of all the maternal deaths occurring in the State of Massachusetts. This work has been continued until the present and we now have records of 984 deaths occurring in Massachusetts during the years 1922 and 1923 among women six months or more pregnant, from causes immediately related to pregnancy or childbirth or from causes where pregnancy or childbirth was a controlling factor. We have further partially completed a similar study of the deaths occurring during 1924. A careful survey of the results of this study indicates that the outstanding factor is lack of prenatal care. This was evident in 89% of the cases studied. Furthermore, septicemia, toxemia, and hemorrhage which are generally considered preventable causes of death, were responsible for 58% of the deaths. Poverty as a cause of maternal mortality did not stand out in this series of cases.

Certain studies of infant deaths were also made but not on the complete scale of the maternal deaths because of the large numbers involved.

Reference should be made to certain publications in the Department's quarterly bulletin *The Commonwealth*, dealing with the maternal and infant mortality problem. These include "A Statistical Study of One Hundred Cesarean Sections", "One Hundred Sudden Deaths" and "A Review of Maternal Mortality in Massachusetts in 1922".

Well Child Conferences. — Coincident with the study of the causes of maternal and infant mortality we have carried on this year well child conferences which have for their purpose stimulation of interest in the local communities in the oversight of the well child. These conferences have included children from the age of infancy up to the beginning of the school age. It may be of value to outline here the method employed in carrying on well child conferences. It should be emphasized at the outset that these conferences are not for the purpose of giving any treatment whatsoever but are intended for children of preschool age who are presumably in reasonable health and whose parents wish to have them looked over for the purpose of getting hygienic advice.

The request for this conference is usually received from some private agency in the town. The conference is not held, however, until the official board of health has been consulted and has signified its willingness for us to meet this request for a conference. Letters are sent to all the local physicians setting a time and place for the well child conference and inviting them to be present. The family physicians of those attending the conference get a copy of the examination sheet which gives the findings of our physicians. The parents of children showing any defects are urged to visit their family physician for treatment. The Division physician in charge of this work, as soon as possible after the conference visits the physicians to whom reports have been sent concerning their patients in order further to familiarize them with the purpose of the conference and to interest them in the examination of well children. Within three months after the date of the well child conference the Division's nurse visits the local nurse in order to find out how the follow-up work is progressing. An effort is made to get groups of mothers together to hear a talk on maternal and child care.

It will be seen that the well child conferences fit in very well with the clinics for underweight children of school age being carried on by the Division of Tuberculosis,

the object of the well child conference being to prevent the child from getting into the state in which he would be an easy prey to tuberculosis, and the object of the tuberculosis clinic for school children being to reach those who, through neglect or some other reason, have not had proper hygienic attention and so are under suspicion of being tuberculous. The more successful the well child conferences are the less need will there be for sanatoria for children who are suffering from disease which can be warded off during the earlier years of life.

Public Health Nursing Service. — For the purposes of the Division of Hygiene the State has been divided into four districts each in charge of a nurse whose duty it is to promote attention on the part of the local organizations, official and unofficial, to the problems of maternal and child hygiene. These nurses keep constantly in touch with local nurses who are handling these problems with a view to assisting them to still higher standards. One of the means to this end has been surveys of existing activities in local communities, these surveys giving the basis for recommendations to the local communities and also keeping the Department fully informed as to what is being done throughout the State.

SCHOOL HYGIENE.

Visitations. — The basic activity of the group of the Division of Hygiene which devote their time to school hygiene work is visiting the different communities of the State in order to assist the local school physicians and school nurses to raise the general standard of the medical supervision of the school child. The personnel involved in this line of activity is composed of one physician and two nurses. During the past year nearly every community in the State has been visited, some of them a number of times. The problems discussed have been many and varied. There seems to be an encouraging and growing desire on the part of the superintendents of schools as well as of school physicians and nurses to take advantage of what assistance the Department is able to offer them. One request for our assistance was from a city which wished our nurse to make a study of the school nursing work being done and to render a critical report upon it. From other places came requests for our nurses to spend several days with the new school nurse who was anxious to get started right on her unfamiliar duties. Group conferences have been held in various sections of the State by our Nursing Consultants. These have been well attended by local nurses apparently to the improvement of the morale of the service.

Normal School Conferences. — As in years past, this Department, in collaboration with the Department of Education, has conducted an annual conference at each of the State Normal Schools for the benefit of the local school medical service and school officials. This year at the end of the regular conference a round table has been held for the school physicians present and another for the school nurses. A discussion of the proper methods to be employed in the examination of the school child formed the basis of the physician's conference. At one of them as many as thirty physicians were present and participated freely in the exercises. The effect of all this interchange of ideas and appreciation of the need of standards is becoming evident throughout the State.

Summer School for Nurses. — During the past summer the Division of Hygiene carried on in connection with the regular summer school at Hyannis Normal School a five weeks' course in school nursing, open to nurses who had done school nursing or were about to begin such work. A group of thirty-nine completed the course. Participation was also had in another course given under the auspices of the School for Public Health Nursing and held at Simmons College during the summer. A further group of thirty nurses was reached here.

Syllabus on Health Education. — From time to time requests have reached this Division for an outline which could be used in teaching health education in the schools. To satisfy this demand there was prepared this year a syllabus which seemed to meet with a ready response inasmuch as an edition of 10,000 copies was exhausted. It is too early yet to measure the effect that this will have upon health habit formation in the schools. It is, however, most decidedly a step in the right direction since if we are to expect really successful results we must rely upon the co-operation of the school teacher rather than upon any other single agency which has access to the schools.

"*Tidings*." — Feeling the need of reaching at regular intervals those who are responsible for the promotion of school hygiene the Division undertook this year a multigraphed bulletin called "*Tidings*" which appears quarterly. It is informal in style and aims to give to the school physician and school nurse the type of information which can be made use of in their daily work. This, too, has met with a ready response.

Present Status of School Nursing. — A compulsory school nursing law was passed in 1921 and provided that cities and towns should have the services of a school nurse, with the proviso that communities with a total valuation of less than \$1,000,000 might be exempted from the provisions of this law by the State Department of Education. At the end of 1924, three years after this law was passed, we find the situation to be that every community in the State has school nursing service or is in the process of making arrangements for such service. It is the purpose of the Division of Hygiene to use its best efforts in conjunction with those of the Department of Education, to interest persons in the communities themselves to help maintain this standard and to bring about as years go on an increasing realization on the part of the cities and towns of the State of the importance of still higher standards of school nursing.

MOUTH HYGIENE.

Nothing new has been attempted this year in the field of mouth hygiene. The Division, unfortunately, early in the year lost the services of its first and only dental hygienist who was called to a national position at a very much increased salary. A successor to this worker has only recently been appointed. Service in an advisory capacity, interspersed with occasional demonstrations in local communities of what can be accomplished in the direction of mouth hygiene, has been maintained.

NUTRITION.

The nutrition staff of the Division of Hygiene consisted of two workers during the greater part of the year but was augmented by the addition of three more in September. These three new workers were employed for the specific purpose of assisting at the tuberculosis clinics for school children being conducted under the auspices of the Division of Tuberculosis. In addition to these three workers, one of the two original nutrition workers of the Division has been assigned to the tuberculosis clinics, making four in all engaged in that type of work.

The general nutrition work of the Division has been similar to that heretofore carried on. Towns desirous of advice concerning their nutrition activities have been reached, as well as many special groups who wished a lecture on this subject. A course was carried on for the nurses at the Department's training school in the Rutland State Sanatorium. A course was given to continuation and vocational school teachers at the Fitchburg summer school in co-operation with the Department of Education. The summer school at Hyannis, for school nurses, had several lectures from our Senior Nutritionist.

Much educational material was prepared for distribution throughout the State, in particular certain leaflets which were especially designed for use in the tuberculosis clinics and the well child conferences. A series of sixteen weekly nutrition talks were prepared for public health nurses.

HEALTH EDUCATION AND PUBLICITY.

The function of this group of workers in the Division of Hygiene is to interpret through the newspapers, through the use of other printed matter, and through pictorial matter, the principles of hygiene as being taught by the different special workers of the Division. Regular weekly articles have been sent to 175 newspapers in the State. The material for these articles was obtained from the different specialists in the Division and was written up in popular form. Special campaigns called for special articles, as for example, during the baby examinations conducted in Boston as a sequel to the Boston Health Show; also special articles during the child health promotion campaign conducted on a national basis last May. A number of radio talks were prepared for broadcasting in Worcester. This was done in co-operation with the local visiting nurse association of that city.

A statement regarding the health education work of the Division would be in-

complete without reference to its share in the promotion of the New England Health Institute which took place in Boston in May. Under the directorship of the Commissioner, the details of organization and the handling of publicity was carried out by the health education group of the Division of Hygiene.

The time-honored work of the Division in the way of health days and health weeks has been continued this year with unabated vigor. An effort has been made, as heretofore, to have these health days focus attention in the local community on its most urgent health need. In this way a health day helps to arouse public opinion in the community for the support of their health activities. Seventeen such health days or weeks have been participated in during 1924.

MISCELLANEOUS ACTIVITIES.

These, as in other years, have consisted of our co-operation with the Harvard Cancer Commission in offering free diagnostic service to all physicians of the State for pathological specimens suspected of being cancerous. In addition the Department co-operated with the American Society for the Control of Cancer, and the State Committee in sending out to every physician in the State the latest and most authoritative information on the control of cancer. An effort has been made to bring to the attention of physicians and the general public further information regarding the importance of periodic health examinations. Public appreciation of the need of this type of health insurance moves slowly but progress is undoubtedly being made from year to year.

Infant and Maternal Mortality in Massachusetts.

DATE.	Deaths Under One Month per 1,000 Live Births.	Deaths Under One Year per 1,000 Live Births.	Deaths from Diseases caused by Pregnancy and Confinement per 1,000 Live Births.
1914	43.6	105.9	5.8
1915	42.6	101.9	4.8
1916	42.1	99.8	5.6
1917	42.1	97.4	6.4
1918	44.8	113.2	8.4
1919	41.4	88.5	7.1
1920	41.6	91.2	7.6
1921	40.2	75.9	6.3
1922	40.1	81.3	6.4
1923	40.2	78.1	5.6
1924	38.0	67.8	6.0

REPORT OF THE DIVISION OF TUBERCULOSIS.

SUMNER H. REMICK, M.D., *Director.*

The year 1924 has proved to be one of marked reorganization and expansion: First, through the transferring of a nursing unit from the Division of Communicable Diseases, and second, by the launching of the Department's Ten-Year Program for the Prevention of Tuberculosis. This rapid growth, together with numerous changes in the administrative methods in the State Sanatoria, field work, and the resulting increase in routine office work, indicated the need of a business manager who should relieve the Director of routine business detail. In July Mr. Merton P. Young was appointed as Assistant Director. He is proving an efficient and loyal assistant.

SANATORIA.

The four State Sanatoria, Rutland, Westfield, North Reading and Lakeville have provided 379,276 days of treatment for 2,392 patients, with an average residence of 310 days. This represents an increase over our 1923 record of 4,223 days of treatment; 92 more patients were hospitalized and an average increase of 41 days of treatment for each patient.

The weekly per capita cost is as follows: Rutland, \$15.90; Westfield, \$13.56; North Reading, \$14.70; Lakeville, \$17.75. The lower per capita cost at Westfield is attributed to the fact that this Institution is now used exclusively for the care of children between the ages of 3 and 16 years, and that there are relatively few bed patients.

Each superintendent is to be congratulated upon the extremely satisfactory management as proved by such low per capita costs. Each institution at present is filled to capacity, and the waiting list for women is much longer than for men. The reports of the Superintendents of the four sanatoria give a comprehensive résumé of the work accomplished during the year. We are indeed fortunate to have had so few changes in our staffs. Dr. Sumner Coolidge, who had been superintendent of Lakeville since its opening in 1909, resigned April 24, 1924. Dr. Leon A. Alley, Assistant Superintendent of Rutland, succeeded Dr. Coolidge at Lakeville. Dr. Alley enters upon his new and arduous duties with a fine background of training and experience in Sanatorium management.

At Rutland, Dr. Halbert C. Hubbard, Senior Physician, was promoted to the Assistant Superintendency to fill the vacancy caused by the promotion of Dr. Leon A. Alley to the Sanatorium at Lakeville, above mentioned.

Owing to the increased demand for hospital beds for children, additions and remodelling of two wards at Westfield have been authorized, and is progressing satisfactorily. These changes will increase our capacity from 265 to 310 beds. With the increasing demand for sanatorium treatment for children the Department has recognized the fact that additional facilities must be provided. In our 1925 Budget money has been requested for remodelling and additions to the North Reading State Sanatorium. If the appropriation is granted it is proposed to remodel three wards and to increase the capacity 40 beds. Children will then be admitted, and if the demand for beds for children increases it is proposed eventually to reserve this Institution for the treatment of children residing in the eastern part of the State.

The Lakeville Institution, in accordance with legislation passed in 1924, is to be remodelled and equipped for the treatment of extra-pulmonary tuberculosis cases alone. Plans for this work have been approved, and it is expected that patients suffering from this type of the disease may be admitted early in the fall of 1925.

The special report of the Legislative Committee on State Administration on the tuberculosis situation in the Commonwealth, particularly hospitalization, was in most instances favorably acted upon by the Legislature. The legislation, as a whole, was excellent and, for the first time in many years, the Department has a very definite policy to carry out. The most interesting features of this legislation was the recognition of tuberculosis as a local problem, thus hospitalizing the adult pulmonary cases in the larger City and County hospitals, with State supervision.

The counties of Middlesex and Worcester were authorized either to build a county hospital or to make a contract, with the approval of the Department, with existing State or County institutions on or before September 1, 1925.

TUBERCULOSIS DISPENSARIES.

The tuberculosis dispensaries throughout the State have satisfactorily accomplished an increasing amount of work. Boards of Health have continued to show a very fine spirit of co-operation with this Division, and reports and follow-up work has been more prompt. During the past year 22,633 were examined and supervised to a large extent through this agency; this is an increase of 5,430 patients over the year 1923. There is no question but what the tuberculosis dispensaries, as a whole, are functioning more satisfactorily, and that the importance of this agency in the diagnosis and supervision of tuberculosis is being recognized by the public. The dispensary law requiring all towns and cities over 10,000 population to maintain dispensaries, was amended in 1924. The law now provides that all cities of 50,000 or over shall maintain a dispensary; that towns under 50,000 may and shall, at the request of the State Department of Public Health. This step is in the right direction, as it allows the Department to determine where dispensaries ought to be maintained in the smaller communities.

Miss Cecelia A. Lemner, with her corps of eight nurses, has made possible for the Division a closer and more helpful supervision of the dispensary work. Uniform standards and reports are being maintained and, with the splendid co-operation received, the future is assured.

CONSULTATION CLINICS.

The Consultation Clinics maintained by the Division of Tuberculosis and conducted by the members of the staff of the four State sanatoria, are held once each month in 16 cities and daily at the sanatoria (except Saturdays, Sundays and holidays). One thousand four hundred and thirty patients have been referred for examination by the family physicians during 1924, an increase of 232 over 1923. This is convincing evidence that the service is appreciated by an increasing number of physicians. These clinics have been well patronized in nearly all sections of the State, except the Lakeville district where only 31 have been examined. During the coming year, every effort will again be made to acquaint and interest the physicians of this district in this type of service offered by the Department. If it is not used to a greater extent the coming year, the service will be discontinued.

CHILDREN'S CLINICS.

The Department has been conducting clinics in the schools in various towns and cities for the past four years. The work has been of an experimental nature and along lines suggested by the work of Dr. Henry D. Chadwick, Superintendent of the Westfield State Sanatorium. Up to the present time the work has been carried on without any extra appropriation or increase in staff. However, the experiments daily brought convincing arguments for the continuation of the work and upon definite lines. Already we had found definite signs of pulmonary or hilum tuberculosis in about 7 or 8 per cent of the school children in the primary and grammar grades, who had been classified as either contact cases or over 10 per cent underweight for height and age. About 25 per cent more had to be classified as suspicious. We had also proved that a large per cent could be restored to normal health and strength under proper care and supervision. The Legislature approved the Ten-Year Juvenile Tuberculosis Program laid out by the Department, and appropriated the necessary funds for the first year's work.

Dr. Henry D. Chadwick was appointed Chief of Clinics and with a staff of three physicians, two nurses, three stenographers and four nutritionists, the field work was started last October in the city of Springfield.

The Program has been very favorably received throughout the Commonwealth. Requests for this service are of daily occurrence; in fact we have already received enough requests from cities and towns to keep our present staff extremely busy for the next twelve months. The Children's Clinics, started in an experimental way by the Department four years ago, have demonstrated their value. They have been reorganized and placed upon a definite basis covering a period of ten years, with the belief that the campaign against tuberculosis in the future will

center around the child. For further details regarding the above program the reader is referred to the annual report of the Commissioner of the State Department of Public Health, Dr. Eugene R. Kelley.

NURSES.

On December 1, 1923, the eight nursing assistants of the Division of Communicable Diseases were transferred to the Division of Tuberculosis to work under the direction of Miss Cecilia A. Lemner, Supervisor of Nurses. The transfer of these nurses has placed all the tuberculosis activities of the Department under the direction and control of the Division of Tuberculosis. It is proving of great value in the development of the field and follow-up work.

FOLLOW-UP WORK.

Miss Lemner, and our eight tuberculosis field nurses, have accomplished a very fine piece of work in this important phase of the Division's activities. The field nurses, during the past year, have checked all our reports and records with the records on file in the local Boards of Health. With the exception of 32 cases in 2 towns, all city and town records have been completed and a report of local record placed in the State files. It is our aim to secure complete and accurate information on all reported cases of tuberculosis in the Commonwealth. This, of course, will take considerable time, but the work is now well systemized and in the near future will be completed and kept up-to-date. It is planned later to make a survey and study of all ex-sanatoria cases. The nurses have also done excellent work in supervising the work of the local dispensary. The Supervisor has personally visited, one or more times, each dispensary during the year.

MEDICAL MEETINGS.

As in the past, medical societies have held meetings at the State sanatoria. Clinical demonstrations for groups of physicians have been conducted by the staffs of the Rutland and Westfield State Sanatoria. The Staff of the Rutland Sanatorium is planning to give a course of lectures during the winter. The course is being arranged for the physicians in the vicinity of Rutland with the idea of presenting to the general practitioner all phases of tuberculosis not ordinarily seen in the daily practice.

At the Westfield State Sanatorium an intensive three-day course in the diagnosis of hilum tuberculosis is given every month by Dr. Chadwick and his Staff. The course includes lectures, demonstrations, examining of patients and interpretation of X-Ray films. The course was primarily arranged for the benefit of the dispensary and school physicians in connection with our juvenile tuberculosis program, but has proved of such value that the Department has extended invitations to all physicians interested; the State providing all travel and hotel expenses for those attending the course.

SUBSIDY.

The law provides that under certain conditions cities and towns providing hospital care for cases of pulmonary tuberculosis in hospitals approved by the Department are to be reimbursed by the Commonwealth at the rate of five dollars (\$5.00) per week per patient. For the year ending November 30, 1924, there have been received 2,187 claims for subsidy from 97 cities and towns. Of this number 1,662 claims amounting to \$171,589.49 were allowed.

LAKEVILLE STATE SANATORIUM.

RESIDENT OFFICERS.

LEON A. ALLEY, *Superintendent*.
 MINOT W. GALE, *Assistant Superintendent*.
 WILLIAM R. MARTIN, M.D., *Assistant Physician*.
 Vacancy, *Assistant Director*.
 Vacancy, *Superintendent of Nurses*.
 SUSAN M. MURPHY, *Head Matron*.
 CHARLES J. ODENWELLER, *Steward*.
 ROBERT A. KENNEDY, *Chief Engineer*.
 THOMAS FRANCIS MAHONY, *Head Farmer*.

REPORT OF THE SUPERINTENDENT.

To EUGENE R. KELLEY, M.D., *Commissioner, Department of Public Health.*

I have the honor to submit the fifteenth annual report of the Lakeville State Sanatorium, for the year ending Nov. 30, 1924. During the year there has been expended \$199,801.76 for maintenance, a gross weekly per capita cost of \$17.75893. There has been expended from special appropriation authorized by Chapter 126, Resolves of 1923, \$6,695.69, authorized by Chapter 494, Resolves of 1923, \$9,044.10, authorized by Chapter 510, Resolves of 1924, \$10,858.19; Extraordinary expenses, \$999.82. The details of these disbursements are contained in the report of the Treasurer. There has been collected from miscellaneous sources (the total of all collections), \$36,635.10. Deducting this amount, less Refund Account of Previous Years, \$1,035.44, from the gross maintenance expense, leaves a net expense of \$164,202.10, a net weekly per capita cost of \$14.5948. There has been collected from private sources \$3,865.20; from Cities and Towns, \$23,804.92; from the United States Veterans' Bureau, \$71.40. Sixty-two cases were supported wholly or in part by private funds, 254 by cities and towns, 86 wholly by the State, 4 by the United States Veterans' Bureau, and there are 24 cases on which settlement has not been determined.

There were 227 patients in the Sanatorium at the beginning of the year, December 1st, 1923, and 193 at the close, November 30th, 1924. The largest number present at one time was 238, and the smallest 192. The daily average number of patients was 216.3606. Daily average number of bed patients were 95.7295, women patients 43.6530, men patients 52.0765. There were 305 patients admitted during the year:— 20 minimal, 163 moderately advanced, 121 advanced, 1 unclassified. The average age of patients admitted was 32 years. Including deaths there were 339 patients discharged, and the average duration of residence was 281 days. Of those discharged 182 gained 2,880 pounds, an average gain of 15.82 pounds per person. Of the discharges there were 1 apparently arrested, 2 less than last year; 14 quiescent, 2 less than last year; 152 improved, 20 more than last year; 63 unimproved, 5 more than last year; 28 not considered, the duration of treatment being less than one month. There were 81 deaths, 7 less than last year. There were 79,188 hospital days of treatment, 1,318 less than last year.

The following table shows the classification on the application blanks and our classification on admission:—

	Classification on Application Blank.	Our Classification on Admission.	Per Cent.
Minimal	53	20	6.56
Moderately Advanced	178	163	53.44
Advanced	50	121	39.67
Unclassified	24	1	.33
	<hr/> 305	<hr/> 305	

MEDICAL REPORT.

Dr. Sumner Coolidge resigned April 24, 1924. Dr. Edmund S. Burwell resigned on August 16, 1924. Dr. Leon A. Alley was appointed Superintendent July 14, 1924. Dr. William R. Martin, a graduate of Tufts Medical School, of the St. Joseph's Hospital, Providence, of the King's County Hospital, Brooklyn, New York, and more recently on the staff of the Brockton Hospital, was appointed Assistant Physician, September 2nd, 1924. For the past year and a half Dr. Martin was associated with the United States Veterans' Bureau.

There is a vacancy on the Medical Staff which has not as yet been filled.

There is great need for a Dentist to spend at least two full days each week at this Institution, as the patients are obliged to go to Middleborough to have dental work done. This works a hardship in many cases. The X-ray plates numbered 466 for the year. Blood drawn for Wassermann test, 10. 2,517 sputums were examined, 905 were positive, 1,612 were negative. Routine urine analysis is made on all admissions and repeated when necessary.

CLINICS.

Consultation clinics have been held monthly at Fall River, Taunton, Brockton and Plymouth. A total of 29 cases have been examined during the past year. 21 Out Patients were examined at the Sanatorium.

FARM.

The farming operations have been carried along through a very successful season, and there has been an abundance of fresh vegetables and fruit served. It is a pleasure to state that the Herd is Tuberculosis free, and on October 14, 1924, was accredited. A large number of swine died from hemorrhagic septicæmia.

The Milk Room at the Dairy has been renovated and a new Pasteurizer, Clarifier, and Separator installed. As the entire amount of milk consumed in this Institution was derived from our own Herd, I believe that the control of an accredited Herd of this kind is most satisfactory from a business, as well as a medical point of view.

IMPROVEMENTS.

The work on the remodelling of the barn into a building for male employees, authorized under Chapter 510, Resolves of 1924, has progressed very satisfactorily, and should be ready for occupancy in about a month. This will greatly relieve the congested housing conditions among the employees.

The erection of a 50,000 gallon steel tank begun last year has been completed. Three new hydrants have been installed about the grounds for additional fire protection.

Extensive repair work has been done to the engines and machines in the Engine Room. Modern equipment has been installed to improve the efficiency of the Power Plant.

The work on the 2½" high pressure steam line from the Power Plant to the Administration Building has been completed.

RECOMMENDATIONS.

I recommend that serious consideration be given to the Water Supply at this Institution, as it was necessary early in August of this year to purchase drinking water from an outside source, because of the in-operative condition of the filter beds and a break-down of the chlorinating apparatus at the pumping station near the river. Surveys and blue prints have already been made in connection with a new water supply from a pond, 4,700 feet from this Institution.

The system of absorption trench for the disposal of sewage has now reached the point where it is practically inadequate for an Institution of this size, and a survey should be made and plans drawn in order that a system of filter beds may be built another year.

With grateful appreciation for your helpful advice and confidence, I am respectfully,

LEON A. ALLEY, *Superintendent.*

REAL ESTATE, 1924.

Grounds, 50 acres		\$9,789 17
Lawns and buildings, 48 acres.		
Roads, 2 acres.		
Woodland, 10 acres		535 70
Mowing, 47 acres		2,250 37
Tillage, 49 acres		4,311 81
Tillage, 30 acres.		
Garden, 19 acres.		
Orchard, 8 acres		611 65
Pasture, 13 acres		696 41
Waste and miscellaneous, 32 acres		1,542 27
Rough pasture, 20 acres.		
Meadow swamp land, 11 acres.		
Sewer beds.		
New coal trestle, 1 acre.		
		<hr/>
		\$19,737 38
Sewage system		4,882 00
Total		<hr/>
		\$24,619 38

Buildings.

Institution buildings	\$140,089 03	
Farm, stable and grounds	47,306 72	
Miscellaneous	91,810 30	\$279,206 05
<hr/>		
Present value of all personal property as per inventory of Dec. 1, 1924		\$303,825 43
		23,718 31
<hr/>		
Grand total		\$327,543 74

EXPENDITURES.

<i>Current expenditures:</i>		
1. Salaries and wages	\$92,670 82	
2. Clothing	—	
3. Subsistence	31,884 42	
4. Ordinary expenses	6,796 36	
5. Office, domestic and outdoor expenses	68,450 16	\$199,801 76
<hr/>		
<i>Extraordinary expenses:</i>		
1. Permanent improvements		16,569 12
Addition to Fire Protection	\$2,485 15	
Addition to Water Supply	3,171 39	
Extraordinary Expenses	54 00	
Employees' Building	10,858 58	
<hr/>		
Grand total		\$216,370 88

Summary of Current Expenses.

Total expenditures	\$216,370 88	
Deduction of extraordinary expenses	16,569 12	
<hr/>		
		\$199,801 76
Deducting amount of sales		7,708 22
<hr/>		
		\$192,093 54

Dividing this amount by the daily average number of patients, 216.3, gives a cost for the year of \$888.08, equivalent to an average weekly net cost of \$17.07.

STATISTICAL TABLES.

TABLE 1. — *Admissions and Discharges.*

	Males.	Females.	Totals.
Patients in Sanatorium Nov. 30, 1923	157	70	227
Patients admitted Dec. 1, 1923, to Nov. 30, 1924	206	99	305
Patients discharged Dec. 1, 1923, to Nov. 30, 1924	238	101	339
Patients remaining in Sanatorium Nov. 30, 1924	125	68	193
Daily average number of patients	146.00	70.355	216.36
Deaths (included in number discharged)	56	25	81

TABLE 2. — *Civil Conditions of Patients admitted.*

	Males.	Females.	Totals.
Single	99	46	145
Married	88	47	135
Widowed	15	3	18
Divorced	4	3	7
<hr/>			305
	206	99	

TABLE 3. — *Age of Patients admitted.*

	Males.	Females.	Totals.	Per- centages.
14 to 20 years	20	16	36	11.80
20 to 30 years	63	49	112	36.72
30 to 40 years	50	18	68	22.30
40 to 50 years	45	11	56	18.36
Over 50 years	28	5	33	10.82
<hr/>			305	
	206	99		

TABLE 4. — *Nativity and Parentage of Patients admitted.*

PLACE OF NATIVITY.	MALES.			FEMALES.			TOTALS.		
	Patient.	Father.	Mother.	Patient.	Father.	Mother.	Patient.	Father.	Mother.
United States:									
Massachusetts	62	19	20	47	16	14	109	35	34
Other N. E. States	7	2	1	6	5	6	13	7	7
Other States	11	11	12	6	3	1	17	14	13
	80	32	33	59	24	21	139	56	54
Other Countries:									
Africa	1	1	1	—	—	—	1	1	1
Albania	1	1	1	2	2	2	3	3	3
Argentina	1	—	—	—	—	—	1	—	—
Armenia	3	3	3	—	1	1	3	4	4
Austria	1	1	1	—	—	—	1	1	1
Belgium	1	1	1	—	—	—	1	1	1
Brazil	1	—	—	—	—	—	1	—	—
Canada	10	20	19	1	7	6	11	27	25
England	6	11	9	1	4	—	7	15	9
Finland	3	5	5	1	1	1	4	6	6
Germany	—	—	—	—	—	1	—	—	1
Greece	1	1	1	1	1	—	2	2	1
India	1	1	1	—	1	—	1	2	1
Ireland	9	28	30	3	13	15	12	41	45
Italy	22	27	27	7	11	11	29	38	38
Japan	1	1	1	—	—	—	1	1	1
Jerusalem	1	1	1	—	—	—	1	1	1
Lithuania	—	—	—	—	1	1	—	1	1
New Brunswick	1	—	—	2	3	4	3	3	4
Newfoundland	1	3	1	1	2	4	2	5	5
Nova Scotia	14	14	15	9	11	9	23	25	24
Poland	6	8	8	1	2	2	7	10	10
Portugal	10	10	11	—	—	1	10	10	12
P. E. Island	2	2	3	2	2	4	4	4	7
Russia	18	20	19	3	4	4	21	24	23
Scotland	3	6	5	4	5	7	7	11	12
Sicily	—	—	—	—	—	1	—	—	1
Spain	1	1	1	—	—	—	1	1	1
Sweden	3	3	3	1	2	2	4	5	5
Syria	1	1	1	1	1	—	2	2	1
Turkey	3	3	3	—	—	—	3	3	3
Unknown	—	1	2	—	1	2	—	2	4
	206	206	206	99	99	99	305	305	305

TABLE 5. — *Residence of Patients admitted.*

Adams, 1	Gloucester, 1	Readville, 1
Arlington, 2	Grafton, 1	Revere, 1
Atlantic, 2	Holbrook, 1	Roslindale, 2
Belmont, 1	Holyoke, 1	Salem, 1
Berlin, 1	Leominster, 1	Somerville, 9
Boston, 112	Lynn, 4	Southbridge, 3
Bridgewater, 1	Malden, 8	Stoneham, 1
Brockton, 3	Marlborough, 3	Springfield, 3
Brookline, 5	Medford, 2	Sudbury, 1
Cambridge, 3	Melrose, 4	Taunton, 2
Cambridgeport, 1	Middleborough, 1	Wakefield, 1
Charlestown, 3	Milford, 4	Waltham, 5
Chelsea, 15	Millbury, 1	Wareham, 1
Chicopee, 2	Millis, 1	Watertown, 4
Chicopee Falls, 1	Mittineague, 1	Wayland, 1
Danvers, 1	Natick, 1	Westfield, 1
Dedham, 1	New Bedford, 14	Westport, 1
Dighton, 2	Newton, 4	Wilmington, 1
Everett, 8	Norwood, 2	Winchester, 1
Fall River, 19	Northampton, 1	Woburn, 1
Fitchburg, 2	North Uxbridge, 1	Worcester, 8
Framingham, 5	Plymouth, 1	Portland, Maine, 1
Gardner, 5	Quincy, 1	Total, 305.

TABLE 6. — *Occupation.*

	Males.	Fe- males.	Totals.		Males.	Fe- Males.	Totals.
Architect	1	—	1	Laundress	—	1	1
Attendant	1	2	3	Lead burner	1	—	1
Baker	4	—	4	Leather cutter	1	—	1
Barber	3	—	3	Lithographer	1	—	1
Bell boy	1	—	1	Locker attendant	1	—	1
Bleaching factory	—	1	1	Lumber yard	1	—	1
Bookkeeper	2	—	2	Machinist	8	—	8
Box factory	1	2	3	Manager, dry good store	1	—	1
Brass foundry	1	—	1	Manicurist	—	1	1
Candy factory	2	1	3	Marble worker	1	—	1
Car cleaner	1	—	1	Mariner	2	—	2
Carpenter	2	—	2	Mason	4	—	4
Cement worker	1	—	1	Merchant	1	—	1
Chauffeur	2	—	2	Moving picture manager	1	—	1
Chair factory	2	—	2	Moving picture operator	1	—	1
Chemist	1	1	2	Nurse	—	1	1
Cigar maker	1	—	1	Nursemaid	—	1	1
Clerks	6	5	11	Office manager	1	—	1
Clerk, cigar	2	—	2	Operator slate mill	1	—	1
Clerk, grocery	4	—	4	Optical factory	1	1	2
Clerk, Post Office	1	—	1	Organ factory	1	—	1
Clerk, receiving	1	—	1	Painter	6	—	6
Clerk, shipping	2	—	2	Paper factory	4	—	4
Cobbler	1	—	1	Photographer	1	—	1
Coil binder, Gen. Elec.	—	1	1	Piano mover	1	—	1
Conductor	1	—	1	Porter	2	—	2
Cook	2	—	2	Printer	3	—	3
Cotton mill	9	7	16	Quartermaster	1	—	1
Cotton mill, winder	1	—	1	Radio factory	—	1	1
Decorator	1	—	1	Rubber factory	1	2	3
Dish washer	1	—	1	Saleslady	—	2	2
Dressmaker	—	1	1	Salesman	6	—	6
Electrician	1	—	1	School teacher	—	1	1
Electrotyper	1	—	1	Secretary	—	1	1
Elevator operator	3	1	4	Sheet metal worker	1	—	1
Errand boy	2	—	2	Shirt factory	1	1	2
Farmer	2	—	2	Shoe shop	5	3	8
Fireman	1	—	1	Silk mill	1	—	1
Fisherman	1	—	1	Stenographer	—	1	1
Foreman, heel factory	1	—	1	Stone cutter	3	—	3
Foreman, construction work	1	—	1	Student	4	1	5
Gate tender R.R.	1	—	1	Tailor	1	—	1
Glass cutter	1	—	1	Tannery	1	—	1
Gold polisher	1	—	1	Teamster	3	—	3
Governess	—	1	1	Telegrapher operator	1	1	2
Hod carrier	2	—	2	Telephone operator	—	1	1
Home	—	2	2	Trainman	1	—	1
Housekeeper	—	9	9	Truck driver	2	—	2
Housewife	—	40	40	Undertaker ass't	1	—	1
Hosiery factory	—	2	2	Upholsterer	3	—	3
Iron foundry	2	—	2	Waiter	5	1	6
Janitor	4	—	4	Watch maker	1	—	1
Kitchen man	2	—	2	Watchman	2	—	2
Knitting mill	1	—	1	Wire factory	1	—	1
Laborer	30	—	30	Woolen mill	—	2	2
Latherer	1	—	1				
					206	99	305

Total number of occupations, 111; total number of patients, 305.

TABLE 7. — *Stage of Disease on Admission.*

	Males.	Females.	Totals.	Per- centages.
Minimal	5	15	20	6.56
Moderately Advanced	102	61	163	53.44
Advanced	98	23	121	39.67
Unclassified	1	—	1	.33
	206	99	305	

TABLE 8. — *Condition on Discharge.*

	Males.	Females.	Totals.	Per- centages.
Apparently Arrested	1	—	1	.29
Quiescent	11	3	14	4.13
Improved	112	40	152	44.84
Unimproved	36	27	63	18.59
Deaths	56	25	81	23.89
Not considered	22	6	28	8.26
	238	101	339	

TABLE 9. — *Deaths.*

DURATION OF DISEASE.	Males.	Females.	Totals.	LENGTH OF RESIDENCE IN SANATORIUM.		
				Males.	Females.	Totals.
Under 1 month	—	—	—	3	1	4
1 to 2 months	2	—	2	4	2	6
2 to 3 months	2	—	2	12	4	16
3 to 4 months	1	2	3	—	1	1
4 to 5 months	4	4	8	6	4	10
6 to 7 months	4	2	6	4	2	6
7 to 8 months	4	—	4	4	—	4
8 to 9 months	2	1	3	4	1	5
9 to 10 months	3	—	3	1	1	2
10 to 11 months	—	—	—	—	1	1
11 to 12 months	3	3	6	2	—	2
12 to 18 months	2	1	3	3	4	7
18 to 24 months	3	5	8	6	2	8
Over 2 years	24	5	29	7	2	9
Unknown	2	2	4	—	—	—
Totals	56	25	81	56	25	81

TABLE 10. — *Cause of Death.*

	Males.	Females.	Totals.
Pulmonary Tuberculosis	56	25	81
Totals	56	25	81

RUTLAND STATE SANATORIUM.

RESIDENT OFFICERS.

ERNEST B. EMERSON, M.D., *Superintendent.*HALBERT C. HUBBARD, M.D., *Assistant Superintendent.*WILLIAM B. DAVIDSON, M.D., *Senior Physician and Roentgenologist.*MARK H. JORESS, M.D., *Assistant Physician.*JOSEPH MULLER, M.D., *Assistant Physician.*Vacancy, *Assistant Physician.*WILLIAM J. O'CONNOR, D.M.D., *Non-resident.*DELYA E. NARDI, *Superintendent of Nurses.*CORA A. PHILLIPS, *Head Matron.*OLIN C. BLAISDELL, *Steward.*HARRY U. WENDELL, *Chief Engineer.*JOSEPH A. CARROLL, *Head Farmer.*

REPORT OF THE SUPERINTENDENT.

To EUGENE R. KELLEY, M.D., *Commissioner, Department of Public Health.*

I have the honor to submit the twenty-eighth annual report of the Rutland State Sanatorium for the year ending Nov. 30, 1924.

During the year there has been expended \$297,691.36 for maintenance, a gross weekly per capita cost of \$15.9014. There has been expended from the special appropriation authorized by Chapter 129, Resolves of 1922, \$135.23. The total expenditure of this special appropriation is \$54,814.57, with a balance of \$185.43 reverting to the treasury.

There has been collected from miscellaneous sources (the total of all collections), \$80,115.62. Deduct this amount, less Refund Account of previous year of \$85.04, from the gross maintenance expense leaves a net expense of \$217,660.78, a net weekly per capita of \$11.6265. There has been collected from private sources \$20,517.78 (the largest collection since 1912); from cities and towns \$42,957.02; from the United States Veterans' Bureau \$14,179.57. One hundred and forty-six cases were supported wholly or in part from private funds; two hundred and eighteen by cities and towns; 37 wholly by the State; two by the United States Veterans' Bureau. There were 54 cases on which settlement has not been determined.

There were 368 patients in the sanatorium at the beginning of the year, 349 at the close. The largest number present at one time was 373 and the smallest 342. The daily average number of patients was 360.02. There were 438 patients admitted during the year; 97 incipient, 171 moderately advanced, 157 far advanced

and 13 unclassified. There were 295 cases admitted from cities and towns of over 25,000 population and 143 from cities and towns under 25,000 population. The average age of patients admitted was 28 years. Including deaths, there were 457 patients discharged, and the average duration of residence was 288 days, 50 days more than last year. Of those discharged 311 patients gained 3,759.50 pounds, an average gain of 12.09 pounds per person. Of the discharges there were 7 arrested cases, 19 less than last year, 24 apparently arrested, 4 less than last year, 224 quiescent, 31 less than last year, 66 improved, 56 unimproved and 18 not considered, the duration of treatment being less than one month. There were 53 deaths, 5 less than last year. There were 9 discharged non-tuberculous. There were 131,769 days of treatment, 2,791 more than last year.

The following table shows the classification on the application blank and our classification on admission:

	Classification on Application Blanks.	Our Classification on Admission.	Per Cent.
Incipient	213	97	22.14
Moderately advanced	187	171	39.04
Far advanced	14	157	35.85
Unclassified	24	13	2.97
	<hr/> 438	<hr/> 438	

The 1923 admissions were classified as follows:

Incipient	111 or 20.62 per cent
Moderately advanced	188 or 34.95 per cent
Far advanced	217 or 40.34 per cent
Unclassified	22 or 4.09 per cent

The following is a summary of the dental work done during the year: Office visits, 2,633; Mouth washes, 181; Prophylactics, 365; Amalgam fillings, 271; Cement fillings, 191; Gutta Percha fillings, 284; Temporary fillings, 164; Surgical dressings, 12; Extractions, 428; Post extraction treatments, 154; Special treatments, 10; Vincent's Disease, 8; Trismus, 2; Abscess cases, 136; Abscesses treated, 136; Inlays, 64; Repairs to plates, 16; Bridges, 36; Crowns, 26; X-rays, 34; Repairs to bridges, 12; Bed treatments, 43; Stomatitis, 14; Bone dissection, 2; Extraction under novocaine, 416; Extraction under ethyl chloride, 12.

The following is a report of the work done in the laboratory during the year:

Urine examinations:			
Routine			538
Special (24 hr. specimens)			9
Private Sanatoria			25
Total			<hr/> 572
	Positive.	Negative.	Total.
Sputum examinations for tuberculosis	2,268	1,904	4,172
Sputum examinations antiformin method	—	4	4
Private Sanatoria	34	35	69
	<hr/> 2,302	<hr/> 1,943	<hr/> 4,245
	Doubtful.	Positive.	Negative. Total.
Blood drawn for Wassermann Test	4	16	356 376
Blood counts			24
Guinea pig inoculations			7
Examination of pleural fluids			9
Smears for differentiation of bacteria			19
Cultures			2

Of 349 patients remaining in the sanatorium Nov. 30, 1924, 269 or 77 per cent were positive cases.

X-RAY REPORT.

X-ray Plates (Chest), 610.

X-ray Plates (Teeth), 34.

Fluoroscopic examinations, 152.

The consultation clinics were held monthly at Worcester, Gardner, Fitchburg and Clinton and the following examinations were made:

Number of patients examined	205
---------------------------------------	-----

Diagnosis:

Tuberculosis	96
Non-tuberculous	17
Observation	91
No diagnosis	1

17 ex-patients reported for follow-up examinations making a total of 235 examinations.

Number of physicians referring cases	52
Number of patients examined once	175
Number of patients examined two times	17
Number of patients examined three times	1
Number of patients examined six times	1
Number of patients examined eight times	1
Number of patients examined nine times	1

There were 10 patients admitted to the sanatorium following examinations at the clinics.

The following examinations were made at the sanatorium:

Patients referred by physicians	43
Patients examined at own request	430

Total	473
-----------------	-----

Diagnosis:

Tuberculosis	106
Non-tuberculous	77
Observation	63

Total	246
-----------------	-----

227 ex-patients reported to the sanatorium for follow-up examinations.

Number of physicians referring cases	32
Number of patients examined once	326
Number of patients examined two times	56
Number of patients examined three times	7
Number of patients examined four times	2
Number of patients examined six times	1

There were 35 patients admitted to the sanatorium following examinations at the sanatorium.

Examinations of school children were made in Ashburnham and Milford:

Total number of school children examined	114
Total number of adults examined at school clinics	7

Total	121
-----------------	-----

Diagnosis (School Children):

Tuberculosis	2
Non-tuberculous	69
Observation	43

Total	114
-----------------	-----

Diagnosis (Adults):

Tuberculosis	3
Non-tuberculous	2
Observation	2

Total	7
-----------------	---

The total of all examinations made during the year exclusive of routine work was 829.

There are 35 nurses in training: 10 Probationers, 14 Intermediates, 4 Juniors and 12 Seniors.

The following have been awarded diplomas: John Francis Fleming, John Prescott Porter, Marian Adelaide Fredsall, Elsie Winifred Brodmerkle, Catherine Anne Harrington, Margaret Mary Donnelly, Anne Josephine Sullivan.

Two months' service with the Worcester Society for District Nursing has been added to the affiliations.

An Alumnae Association was organized with 51 graduates present at the meeting.

Extensive repairs have been made in the power plant in addition to the installation of one 256 horse power Keeler Boiler.

There have been numerous cases of hemorrhagic septicemia in the swine.

The herd remains tuberculosis free.

On account of the large increase in the number of bed cases I am recommending the addition of 4 pupil nurses to the Training School.

With this recommendation it is not out of place to call attention again to the necessity of providing suitable quarters for women employees that they may be removed from the rooms and dormitories adjoining the wards.

It is with a feeling of mingled regret and gratification that I record the resignation of Dr. Leon A. Alley July 13, 1924; regret to lose so efficient and conscientious a coworker and friend; gratification in his well merited promotion to the superintendency of the Lakeville State Sanatorium. Dr. Alley was appointed Assistant Physician November 1, 1916, and promoted to Assistant Superintendent December 1, 1917, qualifying in this position and having served during this period for several months as Acting Superintendent he leaves well equipped to continue his work in a broader field.

Dr. Halbert C. Hubbard appointed Assistant Physician Jan. 1, 1918, was appointed Assistant Superintendent July 14, 1924.

Dr. Moses J. Stone was appointed Assistant Physician Sept. 24, 1923, and resigned Oct. 31, 1924, to accept a position at the Westfield State Sanatorium — a well merited promotion. It is with pleasure that I record the high order of work done by Dr. Stone.

Dr. William B. Davidson, Consulting Roentgenologist, was appointed Senior Physician and Roentgenologist Feb. 6, 1924.

Dr. Joseph Muller was appointed Assistant Physician Aug. 3, 1924.

Mr. Walter C. Brown after 18 years of faithful service as Chief Engineer retired July 31, 1924. Mr. Harry U. Wendell was appointed Chief Engineer Aug. 1, 1924.

I commend for your approval my coworkers who have rendered another year of service.

Deeply appreciating your confidence and the consideration shown me during the year, I am,

Respectfully,

ERNEST B. EMERSON, *Superintendent.*

VALUATION.

Land.

Grounds, 45.837 acres	\$16,706 20	
Lawns and buildings, 35.837 acres.		
Roads, 10.00 acres.		
Woodland, 69.00 acres	2,553 00	
Mowing, 91.49 acres	9,194 50	
Tillage, 28.73 acres	3,550 18	
Tillage, 23.23 acres.		
Garden, 5.55 acres.		
Orchard, 1.64 acres	328 00	
Pasture, 29.52 acres	1,612 40	
Waste and Miscellaneous, 98.46 acres	3,098 60	
Rough Pasture, 73.76 acres.		
Meadow Swamp, 18.22 acres.		
Sewer Beds, 5.98 acres.		
Coal Trestle, .50 acres.		
Sewerage System	15,508 32	
Total		\$52,551 20

Buildings.

Institution buildings	\$543,246 02	
Farm, Stable and Grounds	28,675 00	
Miscellaneous	54,104 92	\$626,025 94
Total		\$678,577 14
Present value of all personal property as per inventory Dec. 1, 1924		93,086 92
Grand total		\$771,664 06

POPULATION.

	Males.	Females.	Totals.
Number received during the year	231	207	438
Number passing out of the institution during the year	241	216	457
Number at end of fiscal year in the institution	179	170	349
Daily average attendance (number of inmates actually present during the year)	182.65	177.37	360.02
Average number of employees and officers during the year	120.36	68.97	189.33

EXPENDITURES.

Current expenditures:			
1. Salaries and wages	\$138,459 80		
2. Clothing	197 78		
3. Subsistence	75,478 76		
4. Ordinary repairs	8,292 54		
5. Office, domestic and outdoor expenses	75,262 48		
			\$297,691 36
Extraordinary expenses:			
1. Permanent improvements to existing buildings			135 23
Grand total			\$297,826 59

Summary of Current Expenses.

Total expenditure	\$297,826 59	
Deducting extraordinary expenses	135 23	
		\$297,691 36
Deducting amount of sales		1,587 29
		\$296,104 07

Dividing this amount by the daily average number of patients, 360.02, gives a cost for the year of \$822.46, equivalent to an average weekly net cost of \$15.8165.

STATISTICAL TABLES.

TABLE 1. — *Admissions and Discharges.*

	Males.	Females.	Totals.
Patients in sanatorium Nov. 30, 1923	189	179	368
Patients admitted Dec. 1, 1923, to Nov. 30, 1924 inclusive	231	207	438
Patients discharged Dec. 1, 1923, to Nov. 30, 1924 inclusive	241	216	457
Patients remaining in sanatorium Nov. 30, 1924	179	170	349
Daily average number of patients	182.65	177.37	360.02
Deaths (included in number discharged)	30	23	53

TABLE 2. — *Civil Condition of Patients Admitted.*

	Males.	Females.	Totals.
Single	138	122	260
Married	85	67	152
Widowed	8	14	22
Divorced	—	4	4
	231	207	438

TABLE 3. — *Age of Patients Admitted.*

	Males.	Females.	Totals.	Percentage.
Under 14 years	—	—	—	—
14 to 20 years	56	45	101	23.06
20 to 30 years	89	105	194	44.29
30 to 40 years	54	32	86	19.64
40 to 50 years	23	17	40	9.13
Over 50 years	9	8	17	3.88
	231	207	438	
Average age	28.86	27.77	28.34	

TABLE 4. — *Nativity and Parentage of Patients Admitted.*

PLACES OF NATIVITY.	MALES.			FEMALES.			TOTALS.		
	Patients.	Fathers.	Mothers.	Patients.	Fathers.	Mothers.	Patients.	Fathers.	Mothers.
United States:									
Massachusetts	137	41	61	132	40	45	269	81	106
Other New England States	11	6	9	18	20	19	29	26	28
Other States	11	15	7	14	13	11	25	28	18
Total native	159	62	77	164	73	75	323	135	152
Other Countries (25):									
Total foreign	72	165	149	43	130	128	115	295	277
Unknown	—	4	5	—	4	4	—	8	9
Grand totals	231	231	231	207	207	207	438	438	438

TABLE 5. — *Residence of Patients Admitted.*

Place	Number	Place	Number	Place	Number
Adams, 3		Holliston, 1		Princeton, 1	
Arlington, 5		Holyoke, 11		Provincetown, 3	
Athol, 1		Hudson, 1		Quincy, 1	
Attleboro, 1		Huntington, 1		Reading, 1	
Auburn, 1		Ipswich, 1		Revere, 5	
Becket, 1		Leicester, 2		Royalston, 1	
Beverly, 1		Leominster, 11		Rutland, 4	
Blackstone, 1		Lexington, 1		Salem, 1	
Bolton, 1		Lowell, 6		Shelburne, 2	
Boston, 121		Ludlow, 2		Somerville, 9	
Brockton, 1		Lynn, 8		Southborough, 1	
Brookline, 4		Malden, 2		Southbridge, 6	
Cambridge, 4		Marlborough, 6		South Hadley, 3	
Carlisle, 1		Maynard, 1		Spencer, 3	
Charlemont, 2		Medford, 5		Springfield, 25	
Chelmsford, 1		Melrose, 1		Sutton, 1	
Chelsea, 8		Middleborough, 1		Three Rivers, 1	
Chicopee, 4		Millbury, 1		Waltham, 4	
Clinton, 1		Millers Falls, 1		Ware, 1	
Colrain, 1		Millville, 1		Warren, 1	
Dalton, 1		Natick, 3		Watertown, 2	
Danvers, 1		Needham, 2		Webster, 7	
Dracut, 1		New Bedford, 1		Westborough, 1	
Everett, 3		Newton, 6		West Boylston, 1	
Fall River, 9		North Adams, 2		Westfield, 3	
Fitchburg, 4		Northbridge, 2		West Springfield, 3	
Framingham, 3		North Brookfield, 4		Williamstown, 1	
Gardner, 4		Northfield, 1		Wilmington, 1	
Grafton, 2		Norwood, 1		Winthrop, 2	
Gloucester, 1		Orange, 1		Woburn, 1	
Greenfield, 2		Palmer, 1		Worcester, 53	
Hardwick, 1		Paxton, 1		Total, 438.	
Haverhill, 4		Pittsfield, 1			

TABLE 6. — *Occupation of Cases Admitted.*

	Males.	Fe- males.		Males.	Fe- males.
Accountant	1	—	Maid, Lady's	—	2
Agent	2	—	Manager, Stage	1	—
Appraiser	1	—	Theatre	2	—
Artist	1	—	Mason	2	—
Attendant	3	3	Merchant	4	—
Baker	2	—	Messenger Boy	1	—
Barber	1	—	Milliner	—	1
Boiler maker	2	—	Mill work	3	7
Bookkeeper	—	3	Moulder	1	—
Brakeman	1	—	Musician	2	—
Bricklayer	1	—	No occupation	2	18
Broker	1	—	Nurse	—	9
Carpenter	7	—	Operator, Elevator	3	—
Cashier	—	1	Telephone	—	3
Chauffeur	11	—	Painter, house	3	—
Cigar maker	1	—	Paymaster	1	—
Clerk, office	20	22	Polisher	1	—
Hotel	1	—	Porter	1	—
Compositor	1	—	Printer	5	—
Conductor	2	—	Repairman	1	—
Cutter, clothing	1	—	Roofer	1	—
Dressmaker	—	1	Salespeople	14	2
Electrician's helper	1	—	Seaman	1	—
Engineer	2	—	Secretary	—	1
Expressman	1	—	Shipper	8	—
Factory	19	18	Shoeworker	11	2
Farmer	4	—	Signalman, R.R.	1	—
Fireman	3	—	Stenographer	—	16
Foreman	8	—	Steward	—	1
Forger	1	—	Storekeeper	1	—
General work	9	—	Student	22	5
Hairdresser	—	1	Teacher	—	8
Housekeeper	—	6	Typist	—	2
Housewife	—	62	Usher	—	1
Housework	—	5	Waitress	—	3
Inspector	2	1	Watchmaker	1	—
Janitor	1	—	Watchman	1	—
Laborer	6	—	Weaver	6	1
Librarian, Ass't	—	1	Woodworker	1	—
Machinist	13	—			

Total number of occupations, 79; total number of patients, 438.

TABLE 7. — *Stage of Disease at Admission.*

	Males.	Females.	Totals.	Percentage.
Incipient	46	51	97	22.14
Moderately advanced	99	72	171	39.04
Far advanced	76	81	157	35.85
Unclassified	10	3	13	2.97
Totals	231	207	438	

TABLE 8. — *Condition on Discharge.*

	Males.	Females.	Totals.	Percentage.
Arrested	4	3	7	1.53
Apparently arrested	10	14	24	5.25
Quiescent	135	89	224	49.02
Improved	25	41	66	14.44
Unimproved	22	34	56	12.25
Deaths	30	23	53	11.60
Non-tuberculous	4	5	9	1.97
Not considered	11	7	18	3.94
	241	216	457	

TABLE 9. — *Deaths.*

DURATION OF DISEASE.	Males.	Females.	Totals.	LENGTH OF RESIDENCE IN SANATORIUM.		
				Males.	Females.	Totals.
Under 1 month	—	—	—	2	—	2
1 to 2 months	—	—	—	3	1	4
2 to 3 months	—	—	—	6	1	7
3 to 4 months	—	—	—	1	3	4
4 to 5 months	1	1	2	2	1	3
5 to 6 months	—	1	1	1	2	3
6 to 7 months	1	—	1	2	1	3
7 to 8 months	2	1	3	1	2	3
8 to 9 months	—	—	—	1	1	2
9 to 10 months	1	—	1	1	1	2
10 to 12 months	2	1	3	1	1	2
12 to 18 months	9	4	13	6	5	11
18 to 24 months	5	2	7	—	3	3
Over 2 years	9	13	22	3	1	4
	30	23	53	30	23	53

TABLE 10. — *Cause of Death.*

	Males.	Females.	Totals.
Pulmonary tuberculosis	28	23	51
Myocarditis	1	—	1
Acute Dilatation of the Heart	1	—	1
	30	23	53

WESTFIELD STATE SANATORIUM.

RESIDENT OFFICERS.

HENRY D. CHADWICK, M.D., *Superintendent.*ROY MORGAN, M.D., *Asst. Superintendent.*HEMAN B. CHASE, M.D., *Physician.*MOSES J. STONE, M.D., *Physician.*THOMAS W. LOFT, D.D.S., *Dentist.*EMILY B. MORGAN, *Supt. of Nurses and Matron.*SARA R. SKERRY, *Dietitian.*JOSEPHINE E. FRENCH, *Treasurer.*FLORENCE I. SMITH, *Steward.*BENJAMIN J. SANDIFORD, *Chief Engineer.*GEORGE H. VAUGHN, *Farmer.*

REPORT OF THE SUPERINTENDENT.

TO EUGENE R. KELLEY, M.D., *Commissioner, Department of Public Health.*

I have the honor to submit the fifteenth annual report of the Westfield State Sanatorium for the year ending November 30, 1924.

During the year there has been expended \$188,123.93 for Maintenance, a gross weekly per capita cost of \$13.5649. The details of these disbursements are contained in the report of the treasurer.

There has been collected from miscellaneous sources \$41,237.74. Deducting this amount from the gross maintenance expense leaves a net expense of \$146,886.19, and a net weekly per capita cost of \$10.591. There has been collected from private funds \$2,639.42; from cities and towns \$37,225.70; 9 cases were supported wholly or in part from private funds; 175 by cities and towns; 65 wholly by the State; 0 by the United States Veterans' Bureau; 6 by the Department of Public Welfare; 49 status undetermined.

There were 266 patients in the Sanatorium at the beginning of the year, 268 at the close. The largest number present at one time was 275 and the smallest 235. The daily average number of patients was 266.7. There were 304 cases admitted during the year; 47 Bronchial Adenitis, 171 Hilum Tuberculosis, 35 Minimal, 8 Moderately Advanced, 35 Advanced, 1 Bone Tuberculosis, 4 Pulmonary Abscess, 2 Cervical Adenitis, 1 Bronchiectasis.

There were 213 cases admitted from cities and towns of over 25,000 population, and 91 from cities and towns under 25,000 population.

The average age of patients was 11.21 years. Including deaths, there were 302 discharges, and the average duration of residence was 12 months and 9 days. Of those discharged 253 gained 3,434 pounds, an average gain of 13.5 pounds per person. Of the discharges there were 50 apparently well, 161 apparently arrested, 30 more than last year; 9 quiescent, 5 more than last year; 39 improved and 27 unimproved. There were 16 deaths, 12 less than last year. There were 97,638 hospital days of treatment, 765 more than last year.

The following table shows the classification on the application blank and our classification on admission:

	Classification on Application Blank.	Our Classification on Admission.
Bronchial Adenitis	—	47
Hilum Tuberculosis	11	171
Minimal	177	35
Moderately Advanced	55	8
Advanced	10	35
Bone Tuberculosis	—	1
Pulmonary Abscess	—	4
Pre-Tubercular	3	—
Cervical Adenitis	1	2
Bronchiectasis	—	1
Unclassified	47	—
	<hr/> 304	<hr/> 304

NOTES OF INTEREST IN THE FOREGOING STATISTICS.

The gross per capita cost was \$1.20 less than last year.

The daily average number of patients was higher than any preceding year.

The average stay was 9 days over one year.

Of the 304 patients admitted, only 35 were classified as advanced, 5 less than the preceding year.

Of the 16 patients that died, 15 were girls. The only boy that died had been a resident of the sanatorium seven years. Furthermore, of the patients admitted the past year with positive sputum, 16 were girls and 3 were boys. For several years I have noticed that many more girls than boys were admitted in the advanced stage of pulmonary tuberculosis and if they have bacilli in the sputum the prognosis was almost invariably fatal. This statement applies to patients under 18 years of age. It is obvious that, as we have no treatment that is effective in open cases of pulmonary tuberculosis in the adolescent period of life, if we are to succeed in preventing these deaths we must find the cases and institute treatment before pulmonary disease has become manifest.

CLINICS.

We have held forty-two examination clinics in twenty-nine different localities in Hampden, Hampshire, Franklin and Berkshire Counties. Two of these clinics were conducted in co-operation with Dr. O'Brien.

	Positive.	Negative.	Suspicious.	Re-examined.	Total.
1. Consultation Clinics	36	54	42	43	175
2. Examination Clinics	36	749	312	431	1,528
3. Out-patients	109	114	47	118	388
	<hr/> 181	<hr/> 917	<hr/> 401	<hr/> 592	<hr/> 2,091

This table shows that 181 new cases of tuberculosis were diagnosed or 8.6% of the total number examined.

The following table illustrates the growth of the extra sanatorium work done at Westfield for the past four years.

	1921.	1922.	1923.	1924.
Consultation Clinics	111	169	229	175
Examination Clinics	354	1,286	1,412	1,528
Out-patients	118	187	313	388
	<hr/> 583	<hr/> 1,642	<hr/> 1,954	<hr/> 2,091
Out-patient X-rays	71	154	344	617

Fifty-four less patients were examined in the Consultation Clinics but these were more than offset by the increase of seventy-five in the number of out-patients. The advantages of a complete examination, including X-Ray, are appreciated by the physicians and for that reason the doctors in the nearby cities of Holyoke and Springfield prefer to send their patients direct to the sanatorium for diagnosis. For this reason we would recommend that the Consultation Clinics in Springfield and Holyoke be discontinued.

TEN-YEAR PROGRAM.

On September 1st I was appointed Chief of Clinics in connection with the state-wide ten-year program for the prevention of tuberculosis. Since then part of my time has been devoted to directing that work. One clinic group has been organized consisting of: Dr. George Sullivan, Dr. David Zachs, Dr. Charles Millet, 2 Nurses, 2 Stenographers, 4 Nutritionists.

Work was begun in Springfield and at the end of November about 2,000 children had been examined. About 350 of these are to be X-rayed. As the portable X-ray unit will not be available until the latter part of December, final figures in regard to diagnoses cannot be given at this time.

Because of the larger number of children that will be recommended for sanatorium care because of these clinics, I would recommend that only children who react to the tuberculin test be admitted. This past year of the 304 admissions, 67 were non-reactors. Most of these non-tuberculous children are cases of malnutrition and are benefited by sanatorium care, but as there is always a waiting list of patients who are more in need of treatment they are deprived of it altogether or else their admission is delayed for weeks or months. If the family doctor is not skilled in making tuberculin tests, it would be economy on the part of the State to send one of the sanatorium staff or clinic physicians to instruct him how to do it. The only non-tuberculous cases that should be considered for admission are those with pulmonary abscess. They do well as a rule under sanatorium care and, if admitted early and pneumothorax treatment given, long periods of invalidism can be avoided.

DENTISTRY.

The following is a report of the resident dentist, Thomas W. Loft, D.M.D.: Examinations, 545; Prophylaxis, 336; Deciduous Extractions, 312; Extractions, 187; R. C. Dressings, 82; R. C. Fillings, 39; Devitalizations, 4; Amalgam Restorations, 130; Amalgam Pulp-capping, 198; Amalgam, 407; Cement, 319; Synthetic Porcelain, 42; Radiographs, 77; Sedative Dressings, 274; Odontalgia Relief, 28; Gingival treatments, 48; Silver Nitrate treatments, 120; Irrigations, 10; Bridges, 1; Inlays, 7; Crowns, 4; Gold fillings, 5; Operative total, 3,175.

The service has proceeded uneventfully during the past year. Probably the most outstanding feature being the frequency of hypotrophic teeth both deciduous and permanent. This is only what might be expected in children with whom malnourishment is a factor. In the coming year I shall attempt to classify these cases by inquiring into their histories.

Simple gingivitis of a low grade chronic character is common but there have been no severe conditions.

There has been no occasion to change any policies in regard to methods of treatment.

SANATORIUM SCHOOL.

The class-rooms have been overcrowded as the average attendance has been 81 more than the previous year. Plans for an addition to the school building have been prepared and estimates for its construction have been submitted.

Miss Waterbury, the principal of the school, files the following report:

	Average Daily Attendance.	Total Enrollment by Grades.
Grade I	25.49	79
Grade II	26.81	52
Grade III	20.74	64
Grade IV	22.45	48
Grade V	21.07	37
Grade VI	26.85	59
Grade VII	21.30	62
Grade VIII	8.91	28
Manual Training	28.96	39
Total Average	287.32	461

An appropriation for \$24,000 was made last year to enlarge two open pavilions. This work has been underway for several months and the girls' pavilion is now ready for occupancy. The boys' building will be ready about March 1st. The original buildings were of the so-called shack construction. The remodelling will make them over into attractive heated wards and will increase our number of beds for patients from 266 to 310.

FIRE HAZARD.

In January a fire occurred in the paint shop located in the basement of the Administration Building. This started about two o'clock in the morning but fortunately was seen by the night attendant before much headway had been made. His alarm was very promptly answered by the employees who put out the flames as soon as hose could be attached to a nearby hydrant. It was fortunate that the flames were confined to the ceiling at the center of the room as otherwise the fire would have got into the partitions and the Administration Building would have been destroyed. Because of this fire, I am again asking for a separate building for the painters' use so that present fire hazard may be removed. I would recommend also that a sprinkler system be considered for installation in the service building.

WATER SUPPLY.

The long continued seasonal drought caused us much uneasiness. By using the utmost care in the use of water during the Fall months, we were able to go along without curtailing any of the necessary activities of the institution. In November it was decided that an emergency existed and arrangements were made to connect our water system with the Westfield City Main. The expense will be about \$3,000. This amount was made available by the Governor and Council from their Emergency Fund. The installation of this water main will be completed early in December and will be of great service in case of fire or lack of sufficient water in our wells.

ACKNOWLEDGMENTS.

The same chaplains have continued their ministrations throughout the year. A service is held each Sunday for the Catholic, Protestant and Jewish patients. The Knights of Columbus of Westfield, the Kiwanis Club in Springfield and other local organizations have furnished gifts and entertainment for the children.

The extra work entailed on the medical staff by the clinics and out-patient service has been most willingly given. The high regard in which the diagnostic service is held by the physicians in this section of the State speaks well for the skillful examinations and good judgment shown by my assistants in their professional work.

To the heads of departments and other employees, I gratefully express my appreciation.

HENRY D. CHADWICK, *Superintendent.*

VALUATION.

Land.

Grounds, 26.8 Acres	\$5,175 00	
Lawns and Buildings, 26.8 Acres.		
Roads, 0 Acre.		
Woodland, 95.6 Acres	4,664 00	
Mowing, 29.6 Acres	2,170 00	
Tillage, 27.0 Acres	1,975 00	
Tillage, 18.08 Acres.		
Garden, 8.92 Acres.		
Orchard, 2.0 Acres	400 00	
Pasture, 70.0 Acres	1,647 00	
Waste and Miscellaneous, 12.6 Acres	690 50	
Rough pasture, 7.6 Acres.		
Meadow swamp land, 0 Acre.		
Sewer beds, 4.0 Acres.		
New coal trestle, 1.0 Acre.		
	<hr/>	
	\$16,721 50	
Sewerage system	13,353 80	
Total	<hr/>	\$30,075 30

Buildings.

Institution Buildings	\$173,567 29	
Farm, Stable and Grounds	26,370 00	
Miscellaneous	59,994 91	
	<hr/>	259,932 20
Total		\$290,007 50
Present value of all personal property as per Inventory of Nov. 30, 1924		78,500 22
Grand total		<hr/> \$368,507 72

POPULATION.

	Males.	Females.	Totals.
Number received during the year	141	163	304
Number passing out of the Institution during the year	149	153	302
Number at end of the fiscal year in the Institution	131	137	268
Daily average attendance (number of inmates actually present during the year)	137.73	129	266.7
Average number of employees and officers during the year	69	45	114

EXPENDITURES.

Current expenditures:		
1. Salaries and wages	\$91,224 49	
2. Clothing	1,798 25	
3. Subsistence	38,583 03	
4. Ordinary repairs	8,616 25	
5. Office, domestic and outdoor expenses	42,176 82	
	<hr/>	\$182,398 84
Extraordinary expenses:		
1. Permanent improvements to existing buildings	\$5,725 09	
2. Water system	3,000 00	
	<hr/>	8,725 09
		<hr/> \$191,123 93

Summary of Current Expenses.

Total expenditure	\$191,123 93	
Deducting extraordinary expenses	8,725 09	
	<hr/>	\$182,398 84
Deducting amount of sales		1,249 30
		<hr/> \$181,149 54

Dividing this amount by the daily average number of patients, 266.7 gives a cost for the year of \$679,225, equivalent to an average weekly net cost of \$13.062.

STATISTICAL TABLES.

TABLE 1. — *Admissions and Discharges.*

	Males.	Females.	Totals.
Number of patients admitted Dec. 1, 1923, to Nov. 30, 1924, inclusive	141	163	304
Number of patients discharged Dec. 1, 1923, to Nov. 30, 1924, inclusive	149	153	302
Number of deaths (including those in previous item)	1	15	16
Number in Sanatorium Dec. 1, 1923	139	127	266
Number remaining Nov. 30, 1924	131	137	268

TABLE 2. — *Civil Condition of Patients Admitted.*

	Males.	Females.	Totals.
Single	141	163	304
Totals	141	163	304

TABLE 3. — *Ages of Patients Admitted.*

	Males.	Females.	Totals.
1 to 13 years	127	131	258
14 to 20 years	13	32	45
21 to 30 years	—	—	—
31 to 40 years	—	—	—
41 to 50 years	1	—	1
51 to 60 years	—	—	—
60	—	—	—
	141	163	304

TABLE 4. — *Nativity and Parentage of Patients Admitted.*

PLACES OF NATIVITY.	MALES.			FEMALES.			TOTALS.		
	Patients.	Fathers.	Mothers.	Patients.	Fathers.	Mothers.	Patients.	Fathers.	Mothers.
United States:									
Massachusetts	106	32	34	129	36	48	235	68	82
Other N. E. States	9	8	8	6	11	8	15	19	16
Other States	5	4	5	14	23	13	19	27	18
Total natives	120	44	47	149	70	69	269	114	116
Other Countries:									
Australia	—	1	2	—	—	—	—	1	2
Armenia	1	—	—	1	3	3	2	3	—
Argentina	1	—	—	1	—	—	2	—	—
Austria	—	3	3	—	2	3	—	5	6
Brazil	—	—	—	—	1	—	—	1	—
Canada	10	29	23	5	19	21	15	48	44
Czecho-Slovakia	—	1	1	—	1	1	—	2	2
Cape Verde Islands	—	1	1	—	1	1	—	2	2
England	—	—	1	—	3	2	—	3	3
Finland	—	1	2	—	2	2	1	3	4
Germany	—	1	—	1	2	—	1	1	1
Ireland	—	15	17	—	13	13	—	28	30
Italy	2	10	10	1	17	17	3	27	27
Greece	—	1	1	—	4	2	—	5	3
Lithuania	—	—	—	—	1	2	—	1	2
Poland	—	6	6	1	14	13	1	20	19
Russia	3	8	8	3	3	3	6	11	11
Portugal	—	2	2	—	1	1	—	3	3
Scotland	—	1	2	1	—	2	1	1	4
Sweden	—	3	—	—	2	1	—	5	1
Spain	—	—	—	—	1	2	—	1	2
	17	83	79	14	88	90	31	171	169
Unknown	4	14	15	—	5	4	4	19	19
	21	97	94	14	93	94	35	190	188
Grand totals	141	141	141	163	163	163	304	304	304

Patients admitted, 304, — males, 141; females, 163.

TABLE 5. — *Residence of Patients Admitted.*

Attleboro, 1	Gloucester, 3	Palmer, 6
Agawam, 6	Greenfield, 1	Pittsfield, 13
Amherst, 2	Grafton, 1	Peabody, 1
Adams, 1	Hopkinton, 1	Quincy, 3
Braintree, 1	Haverhill, 7	Somerville, 5
Beverly, 1	Holyoke, 12	Southwick, 3
Boston, 58	Huntington, 1	South Hadley Falls, 1
Brockton, 12	Hatfield, 1	Somerset, 1
Brookline, 8	Haydenville, 1	Salem, 6
Chicopee, 4	Lowell, 9	Springfield, 23
Chelsea, 5	Lynn, 10	Sutton, 2
Cambridge, 5	Leominster, 11	Tewksbury, 1
Chelmsford, 1	Ludlow, 1	Westfield, 2
Concord, 1	Milford, 4	Watertown, 1
Clinton, 2	Marlborough, 1	Williamsburg, 1
Chester, 1	Methuen, 1	Woburn, 2
Dalton, 1	Malden, 2	Weymouth, 2
Dudley, 1	Medford, 1	West Newbury, 1
Easthampton, 2	Newton, 2	Waltham, 2
Fall River, 2	Northfield, 1	Worcester, 15
Fitchburg, 2	Northampton, 1	Wilbraham, 1
Everett, 1	North Adams, 1	Webster, 2
Falmouth, 2	Norwood, 1	Unknown, 4
Fairhaven, 2	Northbridge, 2	Wakefield, 1
Great Barrington, 1	New Bedford, 4	Total, 304.
Gardner, 2		

TABLE 6. — *Occupation of Cases Admitted.*

	Males.	Females.	Totals.
School	139	160	299
Factory	1	3	4
Attendant	1	—	1
	141	163	304

TABLE 7. — *Stage of Disease at Admission.*

	Males.	Females.	Totals.	Percentage.
Bronchial Adenitis	16	31	47	15.46
Hilum Tuberculosis	96	75	171	56.26
Minimal	17	18	35	11.52
Moderately Advanced	1	7	8	2.63
Advanced	9	26	35	11.52
Bone Tuberculosis	—	1	1	.32
Pulmonary Abscess	2	2	4	1.32
Non-Pulmonary	—	—	—	—
Cervical Adenitis	—	2	2	.65
Bronchiectasis	—	1	1	.32
	141	163	304	100.00

TABLE 8. — *Condition on Discharge.*

	Males.	Females.	Totals.	Percentage.
Apparently Well	26	24	50	16.56
Apparently Arrested	83	78	161	53.31
Quiescent	6	3	9	2.98
Improved	21	18	39	12.81
Unimproved	12	15	27	8.94
Died	1	15	16	5.30
	149	153	302	100.00

TABLE 9. — *Deaths.*

DURATION OF DISEASE.	Males.	Females.	Totals.	LENGTH OF RESIDENCE AT SANATORIUM.		
				Males.	Females.	Totals.
Under 1 month	—	—	—	—	1	1
1 to 2 months	—	—	—	—	—	—
2 to 3 months	—	—	—	—	2	2
3 to 4 months	—	3	3	—	—	—
4 to 5 months	—	1	1	—	2	2
5 to 6 months	—	2	2	—	1	1
6 to 7 months	—	—	—	—	—	—
7 to 8 months	—	—	—	—	—	—
8 to 9 months	—	—	—	—	—	—
9 to 10 months	—	2	2	—	3	3
10 to 12 months	—	1	1	—	—	—
12 to 18 months	—	2	2	—	3	3
18 to 24 months	—	1	1	—	—	—
Over 2 years	1	3	4	1	3	4
	1	15	16	1	15	16

TABLE 10. — *Cause of Death.*

CAUSE.	Males.	Females.	Totals.
Tuberculosis of the Lungs	1	15	16
	1	15	16

NORTH READING STATE SANATORIUM.

RESIDENT OFFICERS.

- CARL C. MACCORISON, M.D., *Superintendent.*
- EARLE C. WILLOUGHBY, M.D., *Assistant Superintendent.*
- JOSEPH W. REDDY, M.D., *First Assistant Physician.*
- JOSEPH L. MOSKOWITZ, M.D., *Assistant Physician.*
- SAMUEL RANDALL, D.M.D., *Dentist.*
- ETHEL M. KNIGHT, *Treasurer and Chief Clerk.*
- CATHERINE RYAN, R.N., *Superintendent of Nurses.*
- MIRA B. ROSS, *Head Matron.*
- J. ELLIS DOUCETTE, *Steward.*
- DANIEL J. SCOTT, *Chief Engineer.*
- EDWARD J. LEARY, *Farmer.*

REPORT OF THE SUPERINTENDENT.

To EUGENE R. KELLEY, M.D., *Commissioner, Department of Public Health.*

I have the honor to submit the 16th annual report of the North Reading State Sanatorium for the year ending November 30, 1924.

In the latter part of August, Dr. Carl C. MacCorison, the Superintendent, left the Sanatorium on leave of absence.

During the year there has been expended \$147,660.93 for maintenance, a gross weekly per capita cost of \$14.7035.

There has been collected from miscellaneous sources \$30,331.61 (the total of all collections). Deducting this amount, less Refunds Account of previous year, \$24.37, from the gross maintenance expense leaves a net expense of \$117,353.79. The net weekly per capita cost was \$11.686. There has been collected from private funds \$7,732.46; from cities and towns \$22,500.97. One hundred and seven cases were supported wholly or in part by private funds; two hundred and thirty-six by cities and towns; and one hundred and fifty wholly by the State.

There were 189 patients at the Sanatorium at the beginning of the year, 196 at the close. The largest number present at any one time was 199, and the smallest 175. The daily average number of patients was 193.12. There were 295 cases admitted during the year, 36 more than last year; 31 Minimal; 143 Moderately Advanced; 116 Advanced; 1 Unclassified; 1 Non-Tuberculosis (Mitral Regurgitation). There were 212 cases admitted from cities and towns of over 25,000 population, and 81 from cities and towns under 25,000 population, 2 unknown. The average age of patients was 32.35 including deaths. There were 288 patients discharged, and the average duration of residence was 9 months and 23 days. Of

those discharged 167 gained 2,103 lbs., an average gain of 12.6 lbs. per person. Of the discharges there were 3 Arrested cases, the same as last year; 11 Apparently Arrested, 2 more than last year; 34 Quiescent, 3 less than last year; 85 Improved; 78 Unimproved. There were 21 patients not considered — the duration of treatment being less than one month. There were 55 deaths, 14 less than last year, and 1 discharged as Non-Tuberculous.

There were 70,681 hospital days of treatment, 1,985 more than last year.

The following table shows the classification on the application blank and our classification on admission.

	Classification on Application Blank.	Our Classification on Admission.
Minimal	52	31
Incipient	16	—
Mod. Advanced	183	143
Advanced	42	116
Deferred	—	1
Unclassified	2	1
Aneurysm of aorta	—	1
Non-Clinical Tuberculous (Mitral Regurgita- tion)	—	1
Empyema	—	1
	<hr/> 295	<hr/> 295

MEDICAL REPORT.

Our medical work this year has been carried on in much the same way as previously except that as time goes on we are prescribing more and more rest, especially for the young with definite abnormal physical signs in their chest. It is somewhat difficult to carry out strict bed treatment for those patients who are feeling well. The radio and cross word puzzles help and I believe an occupational therapist would be of great assistance in solving this difficult problem. Helio-therapy was used during the summer months more than previously. As time goes on the number of bed patients increase and the number of patients able to take exercise decrease, thus bringing more and more work on the employees, and this last year it has been necessary to add one more attendant to the hospital quota.

On December 18, 1923, Dr. Bernard H. Apple, after serving a little over six months, left to take up work at the Mt. Sinai Hospital, New York City. Dr. David Zacks served temporarily as Assistant Physician from July 1, 1924, to August 31, 1924. Dr. Joseph L. Moskowitz, recently of Beth Israel Hospital, Boston, was appointed to fill the vacancy caused by the resignation of Dr. Apple, and began his services August 15, 1924.

The following examinations were made in our laboratory:

Sputum examinations:

Positive	627
Negative	1,805
	<hr/> 2,432
Urine Analyses	950
Red Blood Counts	8
White Blood Counts	83
Differential Blood Counts	6
Pleuritic Fluids	2
G. U. Smears	8
Other Smears	21
Throat Cultures	6
Babcock Milk Tests	57
Quantitative Tests for Sugar in Urine	7
Guinea Pigs Inoculated	17
Gastric Contents	2

REPORT OF WASSERMANN TESTS.

Positive	22
Negative	254
Doubtful	4
Unsatisfactory	6
Number of X-ray films made	555

Of this number 172 were made of consultation clinic cases or underweight school clinic patients.

The following is a summary of the dental work done during the year: Number of patients examined, 291; Prophylaxis, 310; Extractions, 345; Pyorrhea, 12; Vulcanite plates, 10; Synthetic Fillings, 21; Cement Fillings, 9; Amalgam Fillings, 33; Gold Fillings, 12; Temporary fillings, 14; Crowns, 17; Bridges, 29; Defective Crowns and Bridges removed, 25; Plates repaired, 4.

CONSULTATION CLINICS.

The Consultation Clinics have been held monthly in Lowell, Lawrence, Haverhill and Woburn, except that in February none was held in Lowell and Haverhill and in March none was held in Lawrence. The total number of cases referred to these city clinics was somewhat less than last year. The Woburn clinic has again been very poorly attended and we believe that more service would be rendered if this clinic was transferred to Malden or some other city. The following table shows the number of cases referred to these clinics:

Lowell	12
Lawrence	18
Haverhill	55
Woburn	6

In addition to the above there were 74 cases referred to our Sanatorium for consultation, or 52 more than last year. Of the 165 cases examined, 36 were classified as Active Pulmonary Tuberculosis; 16 as Inactive; 5 as Non-Pulmonary Tuberculosis; 105 as Observation; 3 as Hilum Tuberculosis.

The physicians of the Sanatorium assisted in the examinations made at the underweight school clinics held in the following towns or cities: Wayland, Everett, Wilmington (2); Southborough, Georgetown, Groveland, Watertown (3); Merri-mac, Chelmsford (2) and Dracut (2).

The number of ex-patients who have returned for re-examination is 19; of this number 9 returned once, three returned twice and seven returned three times.

IMPROVEMENTS.

Within the past year it became necessary to make repairs on Sanatorium siding. Some of the ties became decayed and had to be replaced. 3,457 square yards of roadway were oiled. One A type hen house was built. The roofs of the wings of the following buildings have been resingled, — East Ward, Pavilions A and B East, and Pavilions A and B West. A small tool shed was built; also a one car steel garage.

The following repairs were made on the refrigerating plant: new rings were put on the compressor; repairs of cold water pipes on condenser; replacing two sets of discharge valves and other minor repairs. The two water tanks and towers were painted. A new Mas-Oleum floor was put down in the reception room of Pavilion A East and diet kitchen of the East Ward.

The water line was replaced from the main line to East Ward, Pavilions A, B and C East. Also new main line to the West Ward and Pavilions A and B West.

Part of the steam line was replaced from the boilers to the fire pump.

Considerable painting was done on the new locker building.

RECOMMENDATIONS.

School Building. — In carrying out the policy of treating children at the North Reading State Sanatorium instead of adults, it is necessary to have a school building. The second floor could be used for employees' quarters, which will be needed in the changes that are expected. It is estimated that the cost of this building, including furnishings, will be \$115,000.

Alterations and Additions to Pavilion B West and Pavilions B and C East.— In Pavilion B West, the locker rooms, lockers, toilet and bathing facilities are inadequate and unsuitable. Additions on the wings are advisable. It is estimated that the desired alterations and additions, including furnishings, can be made for \$26,300. Pavilion B East is in the same condition as Pavilion B West, but additions to the wings are not advisable. It is estimated that the desired alterations and additions can be made for \$8,000. In order that still more beds may be available, it seems best to make additions to both wings of Pavilion C. The reception room in this pavilion will need to be enlarged and on the roof of this last addition, which can be made flat and surrounded by a balustrade, a very good place for carrying out sun treatment in certain cases could be arranged for. It is estimated that these alterations and additions can be made for \$23,200, including furnishings.

The nurses' dining room in the Administration Building is not large enough at present, and with the proposed additions, even more room will be needed, and it is estimated that for \$1,000 the necessary alterations can be made, and furnishings obtained, which will meet our immediate needs.

With the additions and alterations mentioned, the problem of rooming the male employees has not been solved. The old farmhouse should be abandoned, as more and more repairs are needed and the quarters there are not conducive to keeping good employees contented. In the very near future, a male employees' building for the accommodation of at least 25 men should be very strongly considered.

ACKNOWLEDGMENTS.

Religious services have been held as during the last year. I wish to express my appreciation of the faithfulness with which our chaplains have served the Institution.

On November 30, 1924, Rev. Daniel W. Whalen passed away. For over seven years he served our Sanatorium as Catholic chaplain. His presence will be missed by those who knew him.

On behalf of our patients I wish to express thanks for the books, magazines, flowers and other gifts which friends have so kindly contributed.

I wish to thank the staff and heads of departments for their loyalty and faithfulness and also the other employees who deserve much credit for the services rendered, often amidst discouragement.

Respectfully submitted,

EARLE C. WILLOUGHBY, *Acting Superintendent.*

VALUATION.

Land.

Grounds, 11.82 acres	\$569 37	
Lawns and Buildings, 11.07 acres.		
Roads, .75 acre.		
Woodland, 23.66 acres	1,139 70	
Mowing, 16.30 acres	785 17	
Tillage, 5.61 acres	270 23	
Tillage, 1 acre.		
Garden, 4.61 acres.		
Orchard, 3.66 acres	176 30	
Pasture, 2.09 acres	100 67	
Waste and Miscellaneous, 38.61 acres	1,859 84	
Rough Pasture, 7.86 acres.		
Meadow Swamp Land, 30 acres.		
Coal Trestle, .75 acre.		
	<hr/>	
	\$4,901 28	
Sewage system	7,567 31	
	<hr/>	\$12,468 59
<i>Buildings.</i>		
Institution Buildings	\$175,588 68	
Farm, Stable and Grounds	16,392 00	
Miscellaneous	92,729 34	
	<hr/>	284,710 02
		<hr/>
Present value of all personal property as per inventory of December 1, 1924		\$297,178 61
		87,620 12
		<hr/>
Grand total		\$384,798 73

POPULATION.

	Males.	Females.	Totals.
Number received during the year	175	120	295
Number passing out of the Institution during the year	164	124	288
Number at end of fiscal year in the Institution	114	82	196
Daily average attendance (number of inmates actually present during the year)	109.27	83.85	193.12
Average number of employees and officers during the year	48.21	32.94	81.15

EXPENDITURES.

Current Expenditures:			
1. Salaries and Wages		\$74,356	64
2. Clothing		47	28
3. Subsistence		55,726	68
4. Ordinary Repairs		2,845	36
5. Office, Domestic and Outdoor Expenses		12,341	82
			<hr/>
			\$145,317 78
Extraordinary Expenses:			
1. Permanent Improvements to existing buildings			2,343 15
Grand total			<hr/>
			\$147,660 93

Summary of Current Expenses.

Total Expenditures			\$147,660 93
Deducting Extraordinary Expenses			145,317 78
Deducting amount of sales			144,847 54

Dividing this amount by the daily average number of patients, 193.12, gives a cost for the year of \$750.03, equivalent to an average weekly net cost of \$14.42.

STATISTICAL TABLES.

TABLE I. — *Admissions and Discharges.*

	Males.	Females.	Totals.
Patients in Sanatorium Dec. 1, 1923	103	86	189
Patients admitted from Dec. 1, 1923, to November 30, 1924, inclusive	175	120	295
Patients discharged from Dec. 1, 1923, to November 30, 1924, inclusive	164	124	288
Patients remaining in Sanatorium November 30, 1924	114	82	196
Daily average number patients	109.27	83.85	193.12
Deaths (included in number discharged)	38	17	55

TABLE II. — *Civil Condition of Patients Admitted.*

	Males.	Females.	Totals.
Single	67	72	139
Married	98	40	138
Widowed	7	6	13
Divorced	3	2	5
	<hr/>	<hr/>	<hr/>
	175	120	295

TABLE III. — *Age of Patients Admitted.*

	Males.	Females.	Totals.	Percentage.
14 to 20 years	13	13	26	8.81
20 to 30 years	61	58	119	40.34
30 to 40 years	43	30	73	24.75
40 to 50 years	39	13	52	17.62
50 or more	19	6	25	8.48
	<hr/>	<hr/>	<hr/>	
Average	34.82	29.10	32.35	

TABLE IV. — *Nativity and Percentage of Patients Admitted.*

PLACES OF NATIVITY.	MALES.			FEMALES.			TOTALS.		
	Patients.	Fathers.	Mothers.	Patients.	Fathers.	Mothers.	Patients.	Fathers.	Mothers.
United States:									
Massachusetts	71	19	18	65	20	16	136	39	34
Other N. E. States	10	8	8	8	10	13	18	18	21
Other States	12	10	8	6	5	5	18	15	13
Total	93	37	34	79	35	34	172	72	68
Other Countries:									
Armenia	2	2	2	1	1	1	3	3	3
Austria	1	1	1	1	1	1	2	2	2
Belgium	1	1	1	—	—	—	1	1	1
Canada	21	34	34	14	28	27	35	62	61
England	2	6	8	2	5	6	4	11	14
Finland	2	2	2	—	—	—	2	2	2
France	—	1	—	1	2	1	1	3	1
Germany	1	2	1	2	3	3	3	5	4
Greece	1	1	1	2	2	2	3	3	3
Holland	—	—	—	1	1	1	1	1	1
Ireland	16	42	47	11	29	30	27	71	77
Italy	13	18	18	—	2	2	13	20	20
Jamaica	1	1	1	—	—	—	1	1	1
Japan	2	2	2	—	—	—	2	2	2
Lithuania	2	2	2	—	—	—	2	2	2
Norway	1	1	1	—	—	—	1	1	1
Poland	3	3	3	—	—	—	3	3	3
Porto Rico	1	1	1	—	1	—	1	2	1
Portugal	2	2	2	—	—	—	2	2	2
Russia	7	10	9	3	3	3	10	13	12
Scotland	1	2	—	1	1	2	2	3	2
Spain	1	1	1	—	—	—	1	1	1
Sweden	1	2	2	2	4	3	3	6	5
Syria	—	1	1	—	—	—	—	1	1
Total foreign	82	138	140	41	83	82	123	221	222
Unknown	—	—	1	—	2	4	—	22	5
Grand totals	175	175	175	120	120	120	295	295	295

TABLE V. — *Residence of Patients Admitted.*

Adams, 1	Haverhill, 3	Reading, 5
Amherst, 1	Lawrence, 8	Revere, 3
Andover, 1	Lowell, 7	Salem, 6
Arlington, 5	Lynn, 11	Somerville, 12
Baldwinsville, 1	Malden, 10	Southbridge, 1
Beachmont, 1	Marblehead, 1	Uxbridge, 1
Belmont, 3	Maynard, 2	Wakefield, 4
Beverly, 1	Medford, 3	Waltham, 1
Boston, 125	Melrose, 1	Watertown, 7
Brookline, 1	Melrose Highlands, 3	West Acton, 1
Cambridge, 6	Methuen, 1	Westborough, 1
Chelmsford, 1	Millbury, 1	West Medford, 1
Chelsea, 8	Newton, 2	Weymouth, 1
City Mills, 1	Newton Centre, 1	Williamstown, 1
Concord, 2	North Chelmsford, 2	Wilmington, 2
Concord, N. H., 1	North Reading, 3	Winchester, 1
East Longmeadow, 1	North Wilmington, 1	Winthrop, 1
Everett, 12	Peabody, 1	Woburn, 1
Framingham, 3	Quincy, 1	No home, 2
Gardner, 3	Randolph, 1	Total, 295.
Gilbertville, 1		

TABLE VI. — *Occupation of Patients Admitted.*

	Males.	Fe- males.		Males.	Fe- males.
Asst. Baker	1	—	Machinist	8	—
Bookbinder	—	2	Mechanic	2	—
Bookkeeper	—	4	Moulder	3	—
Barber	2	—	Nurse	—	3
Blacksmith	2	—	Orderly	1	—
Busboy	1	—	Pattermaker	1	—
Cashier	1	1	Plumber	1	—
Cigarmaker	1	—	Painter	1	—
Clerk	20	11	Peddler	1	—
Carpenter	7	—	Physician	1	—
Chauffeur	7	—	Pullman conductor	1	—
Clergyman	1	—	Printer	1	—
Chairmaker	1	—	Proofreader	—	1
Constable	1	—	R.R. Employee	2	—
Chef	3	—	Student	5	1
Chemist	1	—	Salesman	6	—
Cutter, neckwear	1	—	Saleslady	—	2
Cigarmaker	1	—	Shoeworker	8	1
Designer	—	1	Shoemaker	2	—
Dyer	1	—	Shipper	2	—
Dental laboratory worker	1	—	St. Ry. Employee	6	—
Dressmaker	—	1	Signpainter	3	—
Domestic	1	14	Steward	1	—
Electrician	2	—	Secretary	—	1
Engineer	1	—	Superintendent	2	—
Factory worker	5	5	Silversmith	1	—
Farmer	1	—	Steamfitter	1	—
Foreman	3	—	Stenographer	—	7
Fireman	2	—	Tailor	2	—
Fisherman	1	—	Teamster	1	—
Gardener	1	—	Teacher	—	2
Housekeeper	—	3	Tel. installer	1	—
Housewife	—	38	Tel. operator	—	7
Hotelkeeper	1	—	Upholsterer	2	—
Ironworker	3	—	Waiter	4	—
Junkman	1	—	Waitress	—	7
Laborer	17	—	Watchmaker	1	—
Laundress	—	1	Weaver	2	—
Longshoreman	1	—	Watchman	1	—
Leatherworker	1	—	None	2	5
Lumber inspector	1	—			
Mill operative	5	2	Totals	175	120

Grand total, 295.

TABLE VII. — *Stage of Disease on Admission.*

	Males.	Females.	Totals.	Percentage.
Minimal	17	14	31	10.50
Moderately Advanced	89	54	143	48.48
Advanced	65	51	116	39.32
Non-Tuberculous	1	—	1	.34
Empyema	1	—	1	.34
Aneurysm of Aorta	1	—	1	.34
Unclassified	1	—	1	.34
Deferred	—	1	1	.34
	175	120	295	—

TABLE VIII. — *Condition on Discharge.*

	Males.	Females.	Totals.	Percentage.
Non-Tuberculous	1	—	1	.34
Apparently Arrested	7	4	11	3.81
Arrested	1	2	3	1.04
Quiescent	22	12	34	11.84
Improved	48	37	85	29.51
Not Considered	13	8	21	7.29
Unimproved	34	44	78	27.08
Died	38	17	55	19.09
Totals	164	124	288	—

TABLE IX. — *Deaths.*

DURATION OF DISEASE.	Males.	Females.	Totals.	LENGTH OF RESIDENCE AT SANATORIUM.		
				Males.	Females.	Totals.
Under 1 month	—	—	—	7	1	8
1 to 2 months	—	—	—	4	3	7
2 to 3 months	—	—	—	3	3	6
3 to 4 months	2	—	2	—	2	2
4 to 5 months	—	—	—	2	1	3
5 to 6 months	—	1	1	4	2	6
6 to 7 months	—	1	1	3	—	3
7 to 8 months	1	—	1	3	—	3
8 to 9 months	—	—	—	—	1	1
9 to 10 months	—	—	—	2	—	2
10 to 12 months	2	1	3	2	—	2
12 to 18 months	9	5	14	4	4	8
18 to 24 months	2	2	4	—	—	—
Over 2 yrs.	22	7	29	4	—	4
Totals	38	17	55	38	17	55

TABLE X. — *Cause of Death.*

	Males.	Females.	Totals.
Tuberculosis of Lungs	34	17	51
Pernicious Anemia	1	—	1
Aneurysm of Aorta	1	—	1
Adenoma of Larynx	1	—	1
Empyema	1	—	1
	38	17	55

REPORT OF STATE EXAMINERS OF PLUMBERS.

EXAMINATIONS.	Examined.	Passed.	Refused.
Boston Dec. 1, 1923	71	19	52
Lowell Dec. 15, 1923	50	8	42
Boston Jan. 3, 1924	105	22	83
Pittsfield Jan. 17, 1924	13	5	8
Boston Feb. 2, 1924	98	23	75
Springfield Feb. 16, 1924	68	12	56
Boston March 1, 1924	98	16	82
Fall River March 15, 1924	52	14	38
Boston April 5, 1924	102	23	79
Worcester April 18, 1924	46	11	35
Boston May 3, 1924	95	25	70
Lowell May 17, 1924	85	19	66
Boston June 7, 1924	91	19	72
Pittsfield June 21, 1924	58	8	50
Boston July 5, 1924	87	15	72
Boston July 19, 1924	84	12	72
Boston Sept. 6, 1924	98	19	79
Springfield Sept. 20, 1924	56	11	45
Boston Oct. 6, 1924	91	21	70
Fall River Oct. 20, 1924	52	9	43
Boston Nov. 1, 1924	80	13	67
Worcester Nov. 15, 1924	39	8	31
	1,619	332	1,287
Licenses issued on account of Examination Dec. 1, 1923—Dec. 1, 1924	Masters. 81	Journeymen. 251	Total. 332
Licenses issued on account of Registrations	6	7	13
Total Licenses issued	87	258	345
Probationary licenses issued			15

REGISTRATIONS.		Journeyman.	Masters.
December, 1924	.	—	—
January, 1925	.	2	—
February, 1925	.	1	3
March, 1925	.	1	1
April, 1925	.	—	1
May, 1925	.	—	—
June, 1925	.	1	—
July, 1925	.	1	—
August, 1925	.	1	—
September, 1925	.	—	—
October, 1925	.	1	—
November, 1925	.	—	1
Totals	.	8	6
Certificates of Registration Dec. 1, 1923, to Dec. 1, 1924	.	.	1
Meetings	.	.	53
Examinations	.	.	22
FEES RECEIVED.			Paid to Treasurer.
Examination Fees, 1,619, at 50¢	.	.	\$809 50
Master Plumber Licenses, 87, at \$2.00	.	.	174 00
Journeyman Plumber Licenses, 258, at 50¢	.	.	129 00
Master Plumber Renewals, 1,979, at 50¢	.	.	989 00
Journeyman Plumber Renewals, 4,232, at 50¢	.	.	2,116 00
Back Fees, 298, at 50¢	.	.	149 00
Total	.	.	\$4,366 50

Summary of Registrations.

Master:		Journeyman:	
Certificate Holders	491	Certificate Holders	502
Licenses ending Dec. 1, 1924	3,318	Licenses ending Dec. 1, 1924	7,430
Deceased Plumbers, none reported.			

Expenditures for the Year 1924.

Salaries (including Salary of Clerk, \$2,000, and wages of 2d and 3d Examiner, \$475)	\$3,462 50
Travel	815 65
Express	31 54
Printing	60 02
Postage	185 57
Stationery and office supplies	52 88
Extra services	78 00
Cleaning	32 60
Telephone, light and heat	127 89
Plumbers' materials	14 00
Total	\$4,860 65

DAVID CRAIG,
Clerk.

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The Commonwealth of Massachusetts

ANNUAL REPORT

OF THE

DEPARTMENT OF PUBLIC HEALTH

FOR THE

YEAR ENDED NOVEMBER 30, 1925





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MASSACHUSETTS STATISTICS FOR 1925.

Estimated population	4,158,103
Death rate per 1,000 population	12.5
Infant Mortality	73.1 per 1,000 live births

The Commonwealth of Massachusetts

DEPARTMENT OF PUBLIC HEALTH,
STATE HOUSE, BOSTON, January 20, 1926.

To the General Court of Massachusetts.

In accordance with the provisions of Section 32 of Chapter 30 of the General Laws, I have the honor to submit herewith the annual report of the Department of Public Health for the year ended November 30, 1925.

Respectfully,
GEORGE H. BIGELOW, M.D.,
Commissioner of Public Health.

ELEVENTH ANNUAL REPORT

OF THE

DEPARTMENT OF PUBLIC HEALTH OF MASSACHUSETTS

REPORT OF THE PUBLIC HEALTH COUNCIL.

At the end of the fiscal year closing November 30, 1925, the State Department of Public Health was constituted as follows:

Commissioner of Public Health GEORGE H. BIGELOW, M.D.

PUBLIC HEALTH COUNCIL.

GEORGE H. BIGELOW, M.D., *Chairman*.

RICHARD P. STRONG, M.D., 1926.

WARREN C. JEWETT, 1925.¹

JAMES L. TIGHE, B.A.Sc., C.E., 1926.

SYLVESTER E. RYAN, M.D., 1928.

ROGER I. LEE, M.D., 1927.

FRANCIS H. LALLY, M.D., 1927.

During the year fifteen formal meetings of the Department were held, as well as meetings of standing committees and special boards. The standing committees of the Council are as follows:

SANITARY ENGINEERING (INCLUDING HOUSING AND RURAL HYGIENE).

Mr. Tighe, Dr. Bigelow and Mr. Jewett (deceased).

PREVENTIVE MEDICINE AND HYGIENE.

Drs. Lee, Bigelow, Lally, Ryan and Strong.

FOOD AND DRUGS.

Drs. Lally and Ryan and Mr. Jewett (deceased).

LABORATORY WORK AND RESEARCH.

Drs. Strong and Bigelow and Mr. Tighe.

PUBLICATIONS.

Drs. Lally and Ryan and Mr. Tighe.

In accordance with its usual custom, the Committee on Sanitary Engineering has met regularly prior to the meeting of the Public Health Council and considered in detail all matters coming before the Department having to do with water supplies, sewage disposal and sanitation generally, subsequently submitting recommendations thereon to the Public Health Council.

As provided by statute the Public Health Council has held hearings on plans for water supplies, sewage disposal systems and contracts pertaining to the use of county tuberculosis hospitals, has considered and approved appointments submitted to it by the Commissioner as required by law, and has discharged other miscellaneous statutory duties.

From time to time the Commissioner has also submitted to the Council for its consideration and advice proposed developments in policy and extensions of activity in the various fields of public health effort with which the Department concerns itself, especially in the control of tuberculosis and venereal disease, in maternal and infant hygiene, and in the new field of health education.

Under Chapter 28 of the Resolves of 1925 the Public Health Council and the Commissioner have served as a Joint Board with the Lawrence Committee on New Water Supply and the Methuen Water Commissioners to extend a study begun in 1924 under Chapter 61 of the Resolves of 1924. A report based on this study will be submitted in January.

In accordance with the second paragraph of Chapter 16 of the Resolves of 1925 the Department studied matters relating to the pollution of the Aberjona River and legislation thereon, and has made its report.

Under Chapter 19 of the Resolves of 1925 the Department has studied the problem of correcting objectionable conditions arising from Spy Pond in Arlington and has so reported.

In accordance with Chapter 23 of the Resolves of 1925, methods of garbage disposal have been studied by the Department and report has been made to the Legislature, which will be published as a separate document.

¹ Deceased November 28, 1925.

Under authority contained in Chapter 300 of the Acts of 1925 a study of conditions existing in the shellfish industry has been made and a report will be made to the Legislature containing recommendations in regard to further legislation on this matter.

Under Chapter 20 of the Resolves of 1925 this Department and the Department of Public Welfare have studied the cancer situation in Massachusetts and made a report thereon which will be printed as a separate document.

At a meeting of the Public Health Council on January 18, 1926, the Commissioner of Public Health presented to the Council a report of the activities of the Department for the fiscal year 1925, and it was voted that this report, together with the foregoing brief summary of the doings of the Public Health Council, be approved and adopted as the report of the State Department of Public Health for the year 1925.

ELEVENTH ANNUAL REPORT OF THE COMMISSIONER OF PUBLIC HEALTH.

To the Public Health Council:

GENTLEMEN:— I have the honor to submit herewith my annual report for the fiscal year ending November 30, 1925.

DR. EUGENE R. KELLEY.

The sudden tragic death of the Commissioner, Dr. Eugene R. Kelley, has profoundly affected the Department. The extent of his loss has even yet not been fully realized. The accomplishments and plans presented in this report should, of course, have been presented by him as they were developed under his leadership. It is fortunate that in the last annual report, in commemoration of the first decade of this Department, Dr. Kelley devoted considerable space to a summary of the developments in the field of public health in this State during this time. In view of the fact that during these ten years he was first Director of the Division of Communicable Diseases and then Commissioner of Public Health, that record is in no small measure one of personal accomplishment, though Dr. Kelley would have been the last to have admitted it. Thus that makes this report an appendix to last year's summary, the whole being a record of the advancement of public health throughout the State while Dr. Kelley was active in the policies of this Department. It is no small measure of gratitude that Massachusetts owes to his memory.

DISEASE PREVALENCE.

This year has shown an increase over last of about 2,500 cases of communicable diseases reported, the total being 93,127, or an increase of about 2.7 per cent. This fortunately does not make up for the drop noted in the last report of 16.5 per cent over 1923. The increase was largely accounted for by the measles cases, though whooping cough has doubled over last year. Along with the increases in these two diseases, lobar pneumonia went up some 20 per cent and the number of influenza cases reported (1,244) trebled over last year. While the reporting of influenza is far from satisfactory due to considerable vagueness still as to what symptoms of upper respiratory tract infection should be so designated, the appreciable increases in reported cases of measles and whooping cough coming largely in the latter part of the year may well mean a general increase in respiratory tract infection, so that by the end of the spring our lobar pneumonia cases and deaths will considerably exceed those of recent years.

Individual consideration may be given to a few of the more significant diseases:

Typhoid Fever.— Since it has been said that the efficiency of a health department can be measured by the typhoid death rate, this disease may be considered first. The foregoing statement was perhaps more true when sanitary science was less well established or sanitary knowledge less generally utilized, since much public health futility can certainly exist in a community with a low typhoid rate. Last year our rate of 1.7 deaths from this disease for every 100,000 persons in the State marked a low point. This year, though the final figures are not yet available, there is apparently a slight increase, and the cases reported have gone up from 566 to 592. Three milk-borne outbreaks accounted for twenty-one cases, which

emphasizes the need of continued extension of the protection afforded by pasteurization. For the rest, the increased exposure of more and more persons to food and water of unknown quality while vacationing probably explains much, though this may be extremely difficult to prove in the majority of instances.

Diphtheria. — There has been a striking drop in diphtheria prevalence, particularly in the fall. Though this is fairly general over the State and in other parts of this country, the diphtheria prevention work of the last few years has certainly played a part since the proportion of cases in the school age group continues its downward tendency, and this is the group in which most of the immunization has been accomplished. Rather than allowing this drop to diminish general utilization of our preventive methods, as has been done this year, we should remember that in this disease years of decreased prevalence increase the volume of susceptible individuals in the community and thus lay the foundation for a compensatory increase in the future. To paraphrase, in times of freedom from diphtheria prepare for an increase of diphtheria.

Tuberculosis. — There has been an increase of cases of all forms of tuberculosis and a decrease in deaths. This is a hopeful sign and suggests earlier recognition. Most of the increase is accounted for by 548 cases of hilum tuberculosis reported as compared with 53 cases in 1924. Each year the State clinics in the schools will continue to contribute largely to this figure. The cases of pulmonary tuberculosis increased by 46, while those of "tuberculosis, other forms", which includes tubercular infection of bones, joints, skin, kidneys, etc., dropped 63 cases.

Scarlet Fever. — There was a drop of some 30 per cent in reported cases, which apparently means that the mild infection of the last few years has worn itself out. There was a decrease in deaths also. This figure should be further favorably affected by the scarlet fever antitoxin which the Department now has available for severe and moderately severe cases.

Anterior Poliomyelitis (Infantile Paralysis). — There was a decrease of more than a third in the cases reported, the total being 167. But the deaths showed a marked increase. Whether this means an increase in the virulence of the disease or that fewer of the abortive cases were reported, it is impossible to say.

Smallpox. — This year Massachusetts has been fortunate in having only three cases of smallpox and no deaths in spite of the general increased prevalence of the disease all over the country in the last few years and its existence just over our border in Rhode Island. It is a commentary on the efficiency of the vaccination of all contacts that there were no secondary cases. This low prevalence of the disease in Massachusetts increases the difficulty of all those officially or non-officially interested in public health in maintaining a high degree of vaccination throughout the community. It is true that the more remote a given disease the more difficult it is to maintain public interest in its prevention. That this obstacle has been at least in part overcome is evidenced by the large amount of vaccine virus distributed by the State which makes a high record in the experience of our laboratory. This is discussed further elsewhere in the report.

Gonorrhea and Syphilis. — Because of the common mode of spread these are, perhaps, the two most baffling of all the communicable diseases. But this year three definite contributions have been made toward clarifying the situation. First, the Department decided that for the immediate future its limited resources should be directed towards improving and extending the clinical service available for those infected. There seemed to be no other group in the community to do this, while there were others who might handle the important educational and legal phases.

Second, under authority of Chapter 215 of the Acts of 1925, the Department changed its regulations governing the reporting of gonorrhea and syphilis so that, while the patient still remains anonymous so long as he remains under treatment to the satisfaction of his physician, the reports go directly to the local health authorities as in all other reportable diseases, rather than directly to this Department as heretofore. It was felt that this might arouse a sense of local responsibility which would substitute action for the general indifference of the past. This change took effect October 1st and for the next two months the numbers reported are essentially the same as for the corresponding months of 1924. This is very en-

couraging, for under any such administrative change there is usually expected a preliminary drop in the number of cases reported.

Third, an educational program has been developed by the Social Hygiene Committee of the League of Women Voters, in co-operation with the American Social Hygiene Association, the Massachusetts Society for Social Hygiene, and this Department. Dr. Helen I. D. McGillicuddy has been obtained as Executive Secretary. Under her able guidance representative groups have been organized in various communities and are studying first hand in their own city or town the factors which make for community health and community disease. Among the latter, of course, gonorrhea and syphilis play an important part. This competent supervision of the study groups will maintain interest while it will prevent misguided action based on immature conclusions. These groups should form a nucleus of informed public opinion to support local health authorities, private physicians, clinics, courts, etc., in their efforts at control. Without such informed public opinion no approach to a solution of the problem of gonorrhea and syphilis is possible.

THE TEN-YEAR JUVENILE TUBERCULOSIS PROGRAM.

As has been repeatedly stated, the basis of this work is the detection of early tuberculosis in school children at an age when effective prevention can be accomplished. The examination is made of three groups of children: i.e., those that are 10 per cent or more underweight, those giving history of contact with cases of tuberculosis, and those children that constitute a "problem" for the teacher. After such important preliminaries as weighing, measuring and history taking have been accomplished by local personnel, the traveling clinic of the Department actually comes to the school for the examination. Then community resources must be almost wholly depended on to see that the special needs disclosed by the examination are met. On this depends in largest measure the success or failure of the program.

The school year 1924-25 was the first year of these clinics. 10,648 children were examined. Of 10,016 children tested 29 per cent reacted positively to tuberculosis. These had their chests X-rayed. The findings on all those examined were as follows:

Pulmonary Tuberculosis — Active and Latent	0.29%
Hilum Tuberculosis — Active and Latent	5.00%
Suspicious Cases	10.00%
Tonsils and Adenoids Needing Care	38.00%
Dentistry Advised	45.00%

Since this year the tuberculin test and X-ray have been used as a routine, it would seem, by consideration of the five factors — namely, history, physical signs, tuberculin test, X-ray and elimination of other causes which might give similar findings — that we can discover all the cases of tuberculosis that are in need of treatment.

Dr. Henry D. Chadwick, Superintendent of the Westfield State Sanatorium, has continued as Chief of Clinics, and under his splendid leadership the program has been enthusiastically received throughout the Commonwealth. The clinic staff has steadily increased, and we now have six physicians, four nurses, two stenographers, three nutritionists, and one X-ray technician on the advance and follow-up units. The follow-up unit has been recently organized, and should prove of the greatest value. The plan now is to examine every child who was found positive or suspicious in the previous examination, and also any other child previously examined whom the school physician or school nurse recommends for observation.

During the present school year over 20,000 children will be examined. Further discussion of this work will be found in the report of the Division of Tuberculosis (Sanatoria).

THE TUBERCULOSIS SANATORIA.

Owing to remodeling and enlarging at these institutions, the plans for which were discussed at length in the last annual report, these State sanatoria have not been filled to capacity, with the exception of the institution at Rutland. Briefly,

the reasons underlying the changes were, first, to provide institutional care for the tuberculous children which will be found in increasing numbers as the juvenile tuberculosis program of the Department progresses, and, second, to meet the increasingly pressing demand for an institution where cases of tuberculous infection of other organs than the lung might receive the specialized helio-therapy which has accomplished so much of late years.

Westfield State Sanatorium. — Early in March work was completed at this institution which permitted the immediate addition of 52 beds, making the present capacity of the institution 310 beds for children. The further immediate need of this institution is an addition to the present school building which was designed to accommodate only 150 children. This should consist of three new class-rooms on the first floor, and accommodations for sixteen employees on the second floor. Also a new carpenter shop and fire-proof office and record room are urgently needed. These have all been allowed for in the budget as submitted.

North Reading State Sanatorium. — This is the second of the institutions to be devoted to the care of tuberculous children. Three wards are now being remodeled and enlarged and should be completed early in February. Children will be admitted to these wards as soon as possible and the entire sanatorium will be made available for children as demand requires. The immediate need is a school building with six class-rooms on the first floor and accommodations for forty-five employees on the second floor. School facilities must be provided for the children and adequate housing for the employees. At present there are fifty-four single rooms for housing ninety-six employees. This addition is asked for in the present budget.

Lakeville State Sanatorium. — Except for the men's ward, this institution is now being remodeled for the care and treatment of extra-pulmonary tuberculosis. The children's unit, with a capacity of fifty beds, was completed about the middle of November, and on November 27th seven children were admitted as patients. Thus, an institution for this type of case has actually started to function in Massachusetts. This will be apparently the first state institution in this country to be devoted exclusively to the care and treatment of both children and adults suffering from this type of tuberculosis and Massachusetts continues to be in the first rank in caring for its tuberculous, both pulmonary and other forms. Great credit is due to those in the past who had sufficient vision to see the needs of this service that is now becoming available.

The remodeling of the women's unit, with a capacity for 75 patients, will be completed sometime in February, 1926. This new departure in service was approved by the Legislature (Chapter 508, Acts of 1924) and necessary funds were available except for the remodeling of the men's ward. Funds for this are badly needed to make the institution complete. They have been included in the budget and will undoubtedly be received.

Rutland State Sanatorium. — This is the only state institution reserved for adult pulmonary tuberculosis, and is largely used for cases from Middlesex and Worcester counties and the Tuberculosis Hospital District of Chelsea, Revere and Winthrop. Short-term contracts were made early in the summer for the care of these patients, as provided in Chapter 500 of the Acts of 1924. The ultimate use to which this institution will be put will depend upon experience under this new program which is but in its infancy and which has been accomplished through legislation which places the burden of hospitalization of adult pulmonary tuberculosis upon the counties and cities of 100,000 population and over.

The particular need at this institution at present is increased refrigeration, which means an addition to the present building.

NEW TUBERCULOSIS LEGISLATION.

In view of the extensive legislation on this subject during the last few years and the splendid support which the Department's program has received from the Legislature, little is asked this year, but it seems necessary to point out certain inconsistencies that have developed.

The law provides that under certain conditions, cities and towns providing hospital care for pulmonary tuberculosis in institutions approved by this Department are reimbursed by the Commonwealth through this Department at the rate of \$5.00 per week per patient. With the withdrawal of three of the sanatoria from

the field of caring for the adult, with the result that more of these cases are being cared for locally, and with the concomitant extension of county and municipal hospital facilities, the amount required for the payment of subsidy incurred in 1925 will be over 25 per cent more than that paid in 1924. Since the subsidy was originally passed to stimulate hospital building rather than to provide maintenance, and since the beds at present available for tuberculosis are reasonably adequate, it would seem that the subsidy had served its purpose and repeal might be considered. Until this is accomplished, however, the Department asks authority to appoint other members of its staff besides the District Health Officers to examine patients on whom subsidy is asked. This is a detail that would increase the ease of administration.

BOARDS OF HEALTH AND PHYSICIANS.

In Massachusetts there is decentralized health authority, which means that the local authorities rather than the State are, in the main, given authority in matters pertaining to health. It is, then, to the local boards of health that we must look for real and lasting progress in public health. But they cannot make bricks without straw. They must have adequate funds and, what is even more important and must come first, the support of sound public opinion in whatever they undertake. This Department has an enormously important function in advising with them and in assisting to build up that informed public opinion.

Of all the groups making up that public, the support of which is indispensable to progress in health, the physicians are the most influential. Looked to individually and collectively by the public as authorities on these matters, a word from them can make or break a program for diphtheria control, child hygiene, or tuberculosis. In addition to advising on these matters, the time has come when they must furnish the service to the families of their patients if preventive medicine is to come out of the pages of pamphlets and the eloquence of lecture platforms and become a reality. If every doctor would send all the children of his practice to the first grade of school with all defects corrected so far as possible and protected against smallpox and diphtheria, what a burden of detection, correction and injection would have been removed and what a contribution to enlightened public opinion the parents of those children would make! Our doctors must become as scrupulously conscientious in practicing preventive as curative medicine. Then preventive medical clinics may be reduced to a minimum since service will be given by a health officer every time that a private physician is consulted. Until then we must use every sound effort to make these services more generally available.

As a practical step in aiding physicians to extend their preventive medical practice, it was suggested to the Department last year by a practicing physician that a card suitable for mailing and placing on the waiting room table would be useful. With this in mind the Department had printed under its own name and the seal of the Commonwealth a card entitled "Preventive Medicine from your Family Physician." This stated briefly what might be accomplished through inoculations against smallpox, typhoid and diphtheria as well as the benefits to be obtained from the health examination, and recommended that these matters be talked over with the family physician. One of these cards was sent to every physician in the State with a letter informing them that if they cared to use them additional cards were available. Nearly two hundred physicians all over the State have asked for these cards as well as certain boards of health, visiting nursing associations, and industries. Two editions totaling some 40,000 have been exhausted and a new edition is in print. It is hoped that the use of this card may be extended as it is a practical means of informing the public of the service available in a private office.

ANTITOXIN AND VACCINE LABORATORY.

A valuable new function has been added to the laboratory's activities. In October the distribution of scarlet fever streptococcus antitoxin was begun. The reports already received from physicians using this product show that it possesses distinct therapeutic value. When administered early and in sufficient amounts it promptly aborts the disease and frequently entirely prevents the serious complications. Its later administration usually results in a cure. In general, its action seems to be as prompt and fully as efficacious as that of diphtheria antitoxin.

It is worthy of comment that the distribution of vaccine virus for protection against smallpox was larger than ever before. The total amount was enough to protect 273,153 persons. Since this is nearly three times the annual number of births, Massachusetts is apparently gaining in the protection of its population against a disease which has visited this country with renewed virulence during the last few years. It is a tribute to the energy of all those officially or unofficially connected with public health that although this State has largely been spared, popular interest in this effective procedure has been not only maintained but increased. Special mention in this connection should be made of the notable work done by the Boston Chamber of Commerce. Other aspects of the importance of distributing these biologic products which are becoming more and more potent factors in disease and death prevention are discussed elsewhere in this report.

In the last annual report the urgent need of expanding the buildings of the State Antitoxin and Vaccine Laboratory at Forest Hills was presented in detail. The present buildings were constructed twenty-one years ago with a capacity for seven employees and they now hold over thirty. The volume of production has increased several hundred per cent, having doubled in the last five years. The production of scarlet fever streptococcus antitoxin has made the need of expansion acute. If the demand for this and other products is to be met, additions to the present buildings must be immediately provided.

There is reason to hope that in the near future the State can make an arrangement with the owners of the property, Harvard University, which will be mutually satisfactory, so that the long delayed addition to the buildings may be made. After much thought, the building of a new plant at a new location for the housing also of the other laboratories of the Department has been given up as impractical.

THE HEALTH OF THE CHILD.

Physically as well as mentally, childhood is a most promising time for preventive work. For a number of years increasing attention has been given to the school child. At first, it was largely focused on the control of communicable diseases, through early diagnosis and quarantine. More recently, methods of active immunization have been extended to other diseases than smallpox; also the physical examination of the school child has been increasingly extended, giving rise to the multiple problems of correction which must follow the detection of defects. Hardly a year goes by without at least one survey directed at some new type of physical fitness or unfitness, with the result that new problems, medical, economic, and social, are presented that must be answered as a basis of sound prevention. All this detection and correction of defects throws an enormous burden on the school teacher, school doctor, and school child. There is no question that the defect which may cause physical breakdown in those years of greatest productivity and economic responsibility should be recognized in the school child and corrected so far as possible, but how much more logical to transfer as much of this as possible to the pre-school years where there is no pedagogical routine that may be dislocated and where results are even easier to obtain.

It is wise that medical supervision of children, immunization against diphtheria, nutritional and dental hygiene, and so on should be introduced in a given community by way of the schools. The children are controlled in the schools which simplifies the administrative problems, results can be checked with a minimum of effort, and through the large numbers of homes affected a broad field of education is opened. But once the introduction has been made through the schools, as much as possible of the detection, correction and prevention of defects and active immunization should be offered to the pre-school child. This is the field in which the private physician can most easily and effectively extend his practice to include prevention. There are few parents today who will not eagerly follow the advice of a doctor in whom they have confidence when that advice has to do with avoiding future sickness in their own young child.

With this in mind, much effort this year has been put by the Department into developing the demonstration well-child conferences throughout the State. The object is to arouse interest in the local communities in child hygiene and to demonstrate to them how they themselves may adequately handle their own problem. The answer may in one case be a fortnightly or monthly conference with a nurse

in charge. In another it may be a more pretentious conference with a local physician or an outside specialist in charge. The matter of rendering such local conferences at least partially self-supporting has been the subject of much earnest discussion with those locally responsible. Such demonstration conferences have been held in fifty-seven towns. As a result, eleven towns have in 1925 started local conferences with physicians in attendance, and six towns, weighing and measuring conferences with a nurse in attendance. Others are under consideration.

It is well recognized that one of the important factors entering into the prevention of infant mortality is the prevalence of breast feeding. Undoubtedly the custom of persistent breast feeding is, at least in part, responsible for the low infant mortality amongst some of our foreign-born stock. In the hope of furthering the practice of breast feeding throughout the State, a plan has been formed to demonstrate in certain communities what can be accomplished by intensive work shared in by family, family physician and visiting nurse. The results thus obtained will serve to set a standard for other communities.

It will be seen, then, that work directed toward raising the standard of health of the child of pre-school age should go hand in hand with that directed toward the child of school age. The aim back of the Department's school hygiene work is to promote health education in the schools and to raise the general standard of school health work. Massachusetts has statutory requirements as to both these points but much remains to be done to render them vital, integral factors in the life of the school. One feature of the work this year, as for several years past, has been the conferences for school nurses, physicians and superintendents, held jointly by this Department and the Department of Education. Another has been the summer course for nurses — and for the first time this year, for teachers — at the State Summer School at Hyannis. The good results of these two measures have already been felt.

SANITARY PROBLEMS.

With increasing urbanization sanitary problems throughout the State are becoming more and more pressing. These have to do with such familiar questions as water supplies, and sewage and garbage disposal. In addition, the recreation grounds at beach or lake, the automobile and summer camp, and the roadside food or gasoline stand offer new and baffling problems of sanitation. It is hoped that we may expand our staff to study adequate means of meeting these, for at present the larger questions of water supply, sewerage and drainage make severe demands on our laboratory and field staff.

Examples of the sanitary significance of congested population have been given in our studies of such subjects as garbage and sewage disposal and the shellfish industry this past summer. It was found that gross offences against health and decency were commonly being committed. Similar offences undoubtedly would be found in these other fields were our resources adequate to study them, and they must be studied if the demands of modern life are to be met.

TRANSFER OF BOARD OF EXAMINERS OF PLUMBERS.

Under legislative authority of Chapter 348 of the Acts of 1925 the Board of Examiners of Plumbers was transferred from this Department to the Department of Civil Service and Registration on December 1, 1925.

CHANGES IN PERSONNEL.

Reference has already been made to the irreparable loss suffered by the Department in the death of Commissioner Dr. Eugene R. Kelley on September 27, 1925. On October 28th he was succeeded by Dr. George H. Bigelow, who was at the time Director of the Division of Communicable Diseases and Deputy Commissioner. This latter position has not yet been filled.

On November 28th Mr. Warren C. Jewett of the Public Health Council died. His valuable service to the Department and the Commonwealth is attested by all. His successor has not yet been appointed.

A still further loss to the Department was the death of Dr. Charles E. Simpson, Health Officer for the Fourth or North Midland Health District. His experience, judgment, and devotion based on eighteen years' experience with the Department means a great loss. His position has not yet been filled.

Dr. Mabel A. Southard and Dr. Mary DeKruif resigned early in the summer.

Miss Frances B. Mayer resigned from the Division of Communicable Diseases early in the year to take up work with the Society for the Prevention of Cruelty to Children.

On October 30th the resignation of Miss Frances L. McCloskey as Secretary of the Department was accepted and Miss Alice M. Ethier was appointed to succeed her.

The organization of the Department is as follows:

Commissioner of Public Health George H. Bigelow, M.D.

PUBLIC HEALTH COUNCIL.

George H. Bigelow, M.D., *Chairman*.

Roger I. Lee, M.D.	Francis H. Lally, M.D.
Richard P. Strong, M.D.	Warren C. Jewett (deceased).
Sylvester E. Ryan, M.D.	James L. Tighe, C.E.

Secretary Alice M. Ethier.

<i>Division.</i>	<i>Administrative Head.</i>	<i>Title.</i>
Administration	¹ —	—
Communicable Diseases	—	Director and Deputy Commissioner
Sanitary Engineering	X. H. Goodnough, C.E.	Director and Chief Engineer
Water and Sewage Laboratories	H. W. Clark	Director and Chief Chemist
Food and Drugs	Hermann C. Lythgoe, S.B.	Director and Chief Analyst
Biologic Laboratories	Benjamin White, Ph.D.	Director and Pathologist
Hygiene	Merrill E. Champion, M.D.	Director
Tuberculosis (Sanatoria)	Sumner H. Remick, M.D.	Director

All these positions are on a full-time basis.

The seven District Health Officers of the Department are for administrative purposes attached to the Division of Communicable Diseases. Their names and districts follow:

First or Southeastern Health District	Dr. Richard P. MacKnight
Second or Eastern Health District	Dr. George T. O'Donnell
Third or Northeastern Health District	Dr. Lyman A. Jones
Fourth or North Midland Health District	—
Fifth or Worcester Health District	Dr. Oscar A. Dudley
Sixth or Connecticut Valley Health District	Dr. H. E. Miner
Seventh or Berkshire Health District	Dr. Leland M. French

The following are the Superintendents of the four State Sanatoria which are under the Division of Tuberculosis (Sanatoria):

Rutland State Sanatorium	Dr. Ernest B. Emerson
Westfield State Sanatorium	Dr. Henry D. Chadwick
North Reading State Sanatorium	Dr. Carl C. MacCorison
Lakeville State Sanatorium	Dr. Leon A. Alley

The State Board of Examiners of Plumbers was also attached to this Department until the end of the period covered by this report. The membership of this Board at present is as follows:

Mr. Charles R. Felton of Brockton, *Chairman*.
 Mr. Frank L. Avery of Holyoke.
 Mr. David Craig of Boston, *Clerk and Executive Officer*.

NEW LEGISLATION.

There is one piece of legislation dealing with milk that the Department has introduced which is of great health significance. The others, while of administrative value, have no great health importance:

¹ The Commissioner is administrative head of this Division.

- (1) An Act relative to the sale of milk.
- (2) An Act relative to the examination of liquor by the Department of Public Health.
- (3) An Act relative to subsidies to cities and towns for pulmonary tuberculosis cases.

Appropriations and Expenditures for the Year ended November 30, 1925.

	Appropriations.	Expended.
Division of Administration	\$29,000 00	\$25,700 00
Division of Hygiene	46,800 00	45,303 87
Maternal and Infant Hygiene	37,091 00	36,189 22
Division of Communicable Diseases	68,740 00	65,918 09
Venereal Diseases	31,900 00	30,562 48
Manufacture and Distribution of Arsphenamine	16,100 00	14,008 86
Division of Food and Drugs	57,686 00	55,997 80
Division of Biologic Laboratories:		
Antitoxin and Vaccine Laboratory	77,700 00	76,340 46
Wassermann Laboratory	18,500 00	17,863 38
Division of Tuberculosis (including Clinic Units)	115,450 00	91,937 76
Subsidies to cities and towns	173,000 00	172,969 23
Division of Sanitary Engineering	58,350 00	53,057 90
Division of Water and Sewage Laboratories	40,700 00	40,170 18
State Examiners of Plumbers	5,450 00	4,860 76
Totals	\$776,467 00	\$730,879 99

Special Appropriations and Expenditures for the Year ended Nov. 30, 1925.

	Appropriation.	Expended.	Balance.
Investigation relative to Sanitary Condition of Spy Pond, Arlington	\$1,500 00	\$1,120 57	\$379 43
Investigation and Study of Garbage Disposal	2,000 00	1,401 36	598 64
Shellfish Control	15,000 00	11,869 24	3,130 76
Neponset Valley Fund, Apportionment of Costs	7,500 00	7,500 00	—
Cancer Investigation	4,000 00	3,568 85	431 15
Architects' Fees	3,628 00	3,628 00	—
Totals	\$33,628 00	\$29,088 02	\$4,539 98

1925 Expenditures from Balances of Special Appropriations of Previous Years.

	Appropriation Balances.	Expended 1925.	Unexpended Balance.
Lawrence and Methuen Water Supply	\$4,735 54	\$998 29	\$3,737 25
Neponset Valley, Expert Testimony	1,275 00	1,017 50	257 50
Totals	\$6,010 54	\$2,015 79	\$3,994 75

Expenditures of Tuberculosis Sanatoria for the Year ended Nov. 30, 1925.

	Rutland.	Westfield.	North Reading.	Lakeville.	Totals.
Appropriation for Maintenance	\$300,380 78	\$222,950 61	\$153,227 68	\$206,330 64	\$882,889 71
Personal Services	138,919 21	95,598 85	72,522 41	86,286 42	393,326 89
Religious Instruction	1,850 00	1,268 80	1,600 00	1,257 50	5,976 30
Travel, Transportation and Office Expenses	3,145 24	2,739 78	1,412 67	3,187 85	10,485 54
Food	75,323 53	44,307 79	36,504 21	22,101 85	178,237 38
Clothing and Materials	260 05	5,184 93	16 12	—	5,461 10
Furnishings and Household Supplies	9,181 61	10,635 92	5,704 08	14,678 41	40,200 02
Medical and General Care	8,890 46	4,924 04	3,670 12	5,780 53	23,265 15
Heat, Light and Power	18,557 23	14,686 99	7,754 28	12,427 37	53,425 87
Farm	11,854 28	11,206 03	4,495 70	12,536 80	40,092 81
Garage, Stable and Grounds	4,133 73	3,161 61	1,548 72	3,988 91	12,832 97
Repairs, Ordinary	8,132 36	8,645 78	3,155 78	5,412 08	25,346 00
Repairs and Renewals	3,337 38	18,319 18	2,829 17	9,894 15	34,379 88
Total Expenditures	\$283,585 08	\$220,679 70	\$141,213 26	\$177,551 87	\$823,029 91
Unexpended Balance	\$16,795 70	\$2,270 91	\$12,014 42	\$28,778 77	\$59,859 80
Average Number of Inmates	345.98	290.95	151.06	130.54	918.53
Weekly per Capita Cost	\$15 76	\$14 58	\$17 98	\$26 16	—
Receipts for Board of Inmates	\$161,403 52	\$72,241 90	\$65,492 69	\$48,718 25	\$347,856 36
Receipts from Sales	1,101 45	2,484 55	588 17	4,416 27	8,590 44
Interest on Bank Balances	253 27	—	140 62	120 58	514 47
Interest on Accounts Receivable	212 40	—	—	—	212 40
Miscellaneous Receipts	177 44	17 89	39 25	2,850 72	3,085 30
Total Receipts	\$163,148 08	\$74,744 34	\$66,260 73	\$56,105 82	\$360,258 97
Refunds, Account of Previous Year	46 88	56 09	45 86	200 88	349 71
Total Collections	\$163,194 96	\$74,800 43	\$66,306 59	\$56,306 70	\$360,608 68

GEORGE H. BIGELOW, M.D.,
Commissioner of Public Health.

REPORT OF DIVISION OF SANITARY ENGINEERING.

X. H. GOODNOUGH, *Director and Chief Engineer.*

OVERSIGHT AND CARE OF INLAND WATERS.

Water Supply and Sewerage.

Under the general and special laws relative to water supply, drainage, sewerage, and the protection of inland waters, this Division received during the year 1925 a total of 317 applications for the approval of plans of systems of water supply, drainage and sewerage or for advice relative thereto, the largest number for many years; in fact, the number of applications has increased steadily and rapidly since the end of the war. Of these applications, 232 related to water supply, 11 to sources of ice supply, 23 to sewerage and sewage disposal, 5 to pollution of streams, and 46 to miscellaneous matters. There were also 74 applications for the examination of private wells, but it became necessary during the year to discontinue the examination of such wells since this work could not be done in addition to more important matters.

No new water supplies were introduced during the year, and the total number of cities and towns supplied was 218 out of a total of 355 cities and towns in the State. While no municipality has introduced a new water supply, numerous additions have been made to existing works in many of the cities and towns, some of them of very considerable importance.

The drouth in the autumn of 1924 continued through the winter of 1925 and many reservoirs failed to fill in the spring of that year. The rainfall in the year 1925 in this State as a whole was a little less than normal. There was an excess of rainfall in the western and northeastern parts of the State and a considerable deficiency in the southeastern districts. An excess of rainfall occurred during the months of March, June, July, October and December, and a considerable deficiency in the months of February, April, May and August. In the other months the rainfall was approximately normal.

The rainfall on the Nashua River drainage area within the watershed of the Wachusett Reservoir, which is approximately in the central part of the State, was 1.87 inches below the normal, while the average flow of the river was about 854,000 gallons per square mile per day, or 21.7 per cent. below the average for the last twenty-nine years, in only four of which has the flow been less than in 1925.

In consequence of the less than normal flow of the streams, Wachusett Reservoir was drawn down to a level more than 25 feet below full reservoir, the lowest point to which it has ever been drawn. The very heavy rainfall during the first of December raised the water somewhat, but at the end of the year it was still 21.61 feet below full reservoir.

THE SANITARY PROTECTION OF WATER SUPPLIES.

Under the provisions of Chapter 111 of the General Laws the advice of the Department has been sought in a number of cases relative to preventing the pollution of water supplies and the violation of rules and regulations adopted for their sanitary protection.

The cities, towns and districts for which rules and regulations have been established are the following:

Abington and Rockland	Chester	Gardner
Adams	Chicopee	Great Barrington
Amherst	Cohasset	(Housatonic)
Andover	Concord	Greenfield
Ashburnham	Dalton	Haverhill
Ashfield	Danvers and Middleton	Hingham and Hull
Attleboro	Easthampton	Holden
Braintree	Fall River	Holyoke
Brockton and Whitman	Falmouth	Hudson
Cambridge	Fitchburg	Lee

Leicester (Cherry Valley and Rochdale)	Newburyport	Salem and Beverly
Leominster	Northampton	Springfield
Lincoln and Concord	North Andover	Springfield and Ludlow
Lynn	Northborough	Stockbridge
Marlborough	Norwood	Taunton
Maynard	Peabody	Wakefield
Medfield (State Hospital)	Pittsfield	Westfield
Metropolitan Water District	Plymouth	West Springfield
Milford	Randolph and Holbrook	Weymouth
Montague	Rockport	Williamsburg
	Russell	Winchester
	Rutland	Worcester

EXAMINATION OF PUBLIC WATER SUPPLIES.

The usual examinations of public water supplies have been made during the year, and many of the sources have been inspected by the engineers of the Division. Samples of the water of the various sources have been analyzed chemically and microscopically, the latter in the case of surface waters, and bacterial examinations have been made when necessary. The following are the average yearly results of chemical analyses of samples of water from public sources examined during the year 1925.

Analyses of the Water of Public Water Supplies.

Averages of Chemical Analyses of Surface-Water Sources for the Year 1925.

[Parts in 100,000.]

CITY OR TOWN.	Source.	Color.	Residue on Evaporation.	AMMONIA.			Chlorine.	Hardness.
				Free.	Total.	Suspended.		
Metropolitan Water District	Wachusett Reservoir, upper end	.24	4.31	.0034	.0148	.0034	.28	1.4
	Wachusett Reservoir, lower end	.06	3.76	.0016	.0099	.0018	.25	1.3
	Sudbury Reservoir	.09	4.17	.0024	.0120	.0023	.28	1.5
	Framingham Reservoir No. 3	.10	3.85	.0021	.0130	.0030	.28	1.5
	Hopkinton Reservoir	.35	4.53	.0025	.0144	.0019	.32	1.4
	Ashland Reservoir	.40	4.64	.0017	.0155	.0020	.26	1.5
	Framingham Reservoir No. 2	.60	7.50	.0081	.0195	.0033	.82	2.0
	Lake Cochituate	.11	7.08	.0072	.0180	.0046	.68	2.9
	Chestnut Hill Reservoir	.10	4.17	.0018	.0116	.0025	.30	1.5
	Weston Reservoir	.07	3.85	.0012	.0104	.0016	.28	1.5
	Spot Pond	.04	4.04	.0021	.0147	.0037	.31	1.5
	Tap in State House	.09	3.92	.0014	.0106	.0015	.30	1.5
	Tap in Revere	.04	4.14	.0013	.0113	.0024	.27	1.5
	Tap in Quincy	.08	4.29	.0008	.0087	.0014	.30	1.6
	Big Sandy Pond	.02	4.27	.0040	.0116	.0019	.73	0.8
	Dry Brook	.17	6.90	.0014	.0087	.0006	.11	5.0
	Bassett Brook	.00	4.45	.0010	.0051	.0004	.10	2.6
Amherst	Amethyst Brook large reservoir	.60	4.71	.0028	.0129	.0012	.14	1.1
	Amethyst Brook small reservoir	.19	3.81	.0028	.0133	.0024	.16	1.1
Andover	Haggett's Pond	.10	4.45	.0020	.0132	.0014	.35	1.9
	Upper Naukeag Lake	.10	2.71	.0012	.0080	.0016	.15	0.8
Ashburnham	Bear Swamp Brook	.30	6.15	.0015	.0094	.0016	.11	3.2
Athol	Phillipston Reservoir	.40	4.02	.0038	.0248	.0084	.16	1.1
	Buckman Brook Reservoir	.38	4.36	.0033	.0232	.0064	.13	1.1
	Thousand Acre Meadow Brook	1.39	6.57	.0064	.0261	.0043	.14	1.4
	Inlet of filter	.62	5.09	.0030	.0186	.0034	.13	1.3
Barre	Outlet of filter	.50	4.67	.0027	.0158	.0031	.13	1.4
	Reservoir	.13	4.55	.0056	.0148	.0038	.18	1.4
Blandford (Fire District)	Freeland Brook	.01	3.85	.0008	.0052	.0012	.24	1.4
Brockton	Silver Lake	.05	4.21	.0032	.0152	.0042	.56	1.1
	Cooley Hill Reservoir	.04	5.51	.0005	.0064	.0012	.34	2.0
Brookfield	Lower Hobbs Brook Reservoir	.13	5.92	.0026	.0170	.0029	.40	2.4
	Upper Hobbs Brook Reservoir	.32	6.64	.0034	.0223	.0041	.39	2.5
Cambridge	Stony Brook Reservoir	.30	6.60	.0049	.0196	.0041	.46	2.6
	Fresh Pond	.05	8.55	.0074	.0152	.0036	.62	4.4
Cheshire	Thunder Brook	.01	5.31	.0004	.0024	.0004	.10	3.5
	Kitchen Brook	.01	5.16	.0007	.0031	.0003	.10	3.6
Chester (Fire District)	Austin Brook Reservoir	.11	4.13	.0013	.0079	.0008	.12	2.0
	Horn Pond	.13	4.00	.0019	.0145	.0013	.12	1.9
Chicopee	Morton Brook	.04	5.24	.0034	.0049	.0014	.27	1.6
	Cooley Brook	.45	5.45	.0074	.0123	.0029	.17	1.7
Clinton	Tap in town	.11	4.96	.0009	.0102	.0024	.23	1.3

Averages of Chemical Analyses of Surface-Water Sources, etc. — Continued.

[Parts in 100,000.]

CITY OR TOWN.	Source.	Color.	Residue on Evaporation.	AMMONIA.			Chlorine.	Hardness.
				Free.	ALBUMINOID.			
					Total.	Sus-pended.		
Colrain (Griswoldville)	McClellan Reservoir . . . .	.01	9.27	.0007	.0061	-	.10	5.2
Colrain (Fire District No. 1)	Mountain Brook Reservoir . . . .	.04	8.83	.0003	.0043	.0002	.11	6.8
Concord	Nagog Pond . . . . .	.05	3.21	.0021	.0094	.0008	.33	1.1
Dalton (Fire District)	Egypt Brook Reservoir . . . . .	.19	4.35	.0018	.0083	.0012	.10	1.5
	Windsor Reservoir . . . . .	.37	4.97	.0059	.0162	.0029	.09	2.5
	Cady Brook . . . . .	.22	5.31	.0017	.0091	.0011	.11	2.5
Danvers	Middleton Pond . . . . .	.35	5.22	.0047	.0171	.0024	.32	1.7
	Swan Pond . . . . .	.28	5.06	.0071	.0198	.0052	.29	1.6
Deerfield (South Deerfield Water Supply District)	Roaring Brook . . . . .	.07	6.22	.0005	.0062	.0013	.12	4.0
Egremont (South)	Goodale Brook . . . . .	.01	5.67	.0011	.0049	.0011	.09	3.2
FALL RIVER	North Watuppa Lake . . . . .	.02	4.01	.0020	.0121	.0020	.49	1.2
Falmouth	Long Pond . . . . .	.01	3.78	.0007	.0097	.0017	1.00	0.6
FITCHBURG	Meetinghouse Pond . . . . .	.06	3.50	.0035	.0151	.0022	.19	1.0
	Scott Reservoir . . . . .	.17	4.24	.0100	.0176	.0044	.19	1.0
	Wachusett Lake . . . . .	.06	3.68	.0054	.0123	.0024	.19	0.9
	Falulah Brook . . . . .	.21	3.49	.0049	.0158	.0034	.18	0.9
	Ashby Reservoir . . . . .	.25	3.44	.0061	.0178	.0029	.17	1.0
Gardner	Crystal Lake . . . . .	.07	4.74	.0027	.0132	.0018	.29	2.1
GLOUCESTER	Dike's Brook Reservoir . . . . .	.27	4.40	.0025	.0130	.0030	.82	0.9
	Wallace Reservoir . . . . .	.51	5.07	.0027	.0162	.0032	.89	0.8
	Haskell Brook Reservoir . . . . .	.10	4.19	.0016	.0088	.0012	.76	0.8
Great Barrington (Fire District)	East Mountain Reservoir . . . . .	.07	6.31	.0030	.0081	.0015	.10	4.1
Great Barrington (Housatonic)	Long Pond . . . . .	.02	8.30	.0014	.0118	.0006	.12	7.0
Greenfield	Glen Brook Upper Reservoir . . . . .	.02	5.88	.0034	.0092	.0024	.17	3.7
	Glen Brook Lower Reservoir . . . . .	.02	6.16	.0028	.0085	.0013	.16	3.7
Hadley (Water Supply District)	Hart's Brook Reservoir . . . . .	.06	5.23	.0010	.0100	.0013	.16	2.5
Hatfield	Running Gutter Brook Reservoir . . . . .	.06	6.80	.0005	.0045	.0002	.21	2.8
Haverhill	Johnson's Pond . . . . .	.13	5.36	.0020	.0141	.0025	.37	2.4
	Crystal Lake . . . . .	.13	4.09	.0014	.0129	.0020	.29	1.4
	Kenoza Lake . . . . .	.11	5.12	.0024	.0181	.0063	.35	2.1
	Lake Saltonstall . . . . .	.06	6.61	.0055	.0170	.0039	.55	3.1
	Pentucket Lake . . . . .	.11	5.11	.0026	.0161	.0042	.37	2.3
	Millvale Reservoir . . . . .	.41	5.73	.0036	.0163	.0029	.32	2.1
Hingham	Accord Pond . . . . .	.07	3.94	.0029	.0123	.0019	.61	0.9
	Fulling Mill Pond . . . . .	.26	6.40	.0070	.0172	.0055	.65	1.9
Hinsdale (Fire District)	Reservoir . . . . .	.12	3.00	.0011	.0073	.0007	.08	0.8
HOLYOKE	Whiting Street Reservoir . . . . .	.10	5.84	.0069	.0216	.0063	.23	3.2
	Fomer Reservoir . . . . .	.33	4.46	.0023	.0153	.0032	.15	1.2
	Wright and Ashley Pond . . . . .	.08	5.16	.0024	.0136	.0031	.16	2.5
	High Service Reservoir . . . . .	.08	4.25	.0021	.0151	.0033	.16	2.0
	White Reservoir . . . . .	.19	4.15	.0036	.0139	.0028	.13	1.5
Hudson	Gates Pond . . . . .	.04	4.12	.0044	.0131	.0020	.22	1.4
Huntington (Fire District)	Cold Brook Reservoir . . . . .	.11	4.38	.0004	.0052	.0008	.16	1.3
Ipswich	Dow's Brook Reservoir . . . . .	.42	5.62	.0050	.0171	.0043	.56	2.0
LAWRENCE	Merrimack River, filtered . . . . .	.32	5.75	.0062	.0078	-	.56	1.4
Lee	Codding Brook Upper Reservoir . . . . .	.09	5.14	.0034	.0088	.0008	.12	3.3
	Codding Brook Lower Reservoir . . . . .	.12	4.22	.0016	.0100	.0013	.12	2.0
	Basin Pond Brook . . . . .	.36	4.21	.0012	.0117	.0014	.10	1.5
Lenox	Reservoir . . . . .	.04	7.96	.0006	.0069	.0015	.09	6.4
	Laurel Lake . . . . .	.05	13.00	.0084	.0167	.0049	.19	10.5
LEOMINSTER	Morse Reservoir . . . . .	.15	3.13	.0047	.0127	.0019	.18	0.6
	Haynes Reservoir . . . . .	.16	3.21	.0063	.0175	.0048	.18	0.7
	Fall Brook Reservoir . . . . .	.07	3.05	.0020	.0106	.0024	.18	0.7
Lincoln	Sandy Pond . . . . .	.01	3.07	.0011	.0096	.0011	.30	1.1
Longmeadow	Cooley Brook . . . . .	.06	6.43	.0094	.0120	.0041	.24	3.2
LYNN	Birch Reservoir . . . . .	.11	5.55	.0072	.0182	.0042	.67	2.1
	Breed's Reservoir . . . . .	.29	6.54	.0073	.0170	.0031	.56	2.2
	Walden Reservoir . . . . .	.59	6.35	.0070	.0193	.0041	.56	2.3
	Hawkes Reservoir . . . . .	.52	6.64	.0109	.0230	.0043	.58	2.7
Manchester	Gravel Pond . . . . .	.03	4.16	.0015	.0115	.0020	.72	1.2
MARLBOROUGH	Lake Williams . . . . .	.09	5.75	.0031	.0172	.0028	.59	2.3
	Millham Brook Reservoir . . . . .	.39	5.76	.0087	.0209	.0047	.36	1.9
Maynard	White Pond . . . . .	.04	3.20	.0013	.0121	.0037	.23	1.0
Milford	Charles River, filtered . . . . .	.17	4.77	.0018	.0059	-	.29	1.7
Montague	Lake Pleasant . . . . .	.01	3.63	.0026	.0084	.0020	.13	1.0
Nantucket	Wannacomet Pond . . . . .	.07	8.00	.0029	.0235	.0123	2.65	2.1
NEW BEDFORD	Little Quittacas Pond . . . . .	.21	4.42	.0032	.0139	.0022	.51	1.1
	Great Quittacas Pond . . . . .	.24	4.47	.0021	.0140	.0021	.51	1.0
NEWBURYPORT	Artichoke River . . . . .	.26	10.17	.0129	.0356	.0105	.53	4.4

Averages of Chemical Analyses of Surface-Water Sources, etc. — Concluded.

[Parts in 100,000.]

CITY OR TOWN.	Source.	Color.	Residue on Evaporation.	AMMONIA.			Chlorine.	Hardness.
				Free.	ALBUMINOID.			
					Total.	Sus- pended.		
NORTH ADAMS	Notch Brook Reservoir	.03	7.47	.0023	.0059	.0011	.09	6.3
	Broad Brook	.13	3.89	.0028	.0078	.0021	.10	2.7
NORTHAMPTON	Mount Williams Reservoir	.01	7.73	.0023	.0083	.0015	.09	5.5
	Middle Reservoir	.28	5.47	.0024	.0106	.0019	.15	1.9
North Andover	Mountain Street Reservoir	.08	4.43	.0012	.0074	.0013	.13	2.0
	Great Pond	.10	6.17	.0031	.0171	.0015	.38	1.9
Northborough	Lower Reservoir	.50	5.49	.0031	.0225	.0078	.23	1.4
	Upper Reservoir	.62	5.59	.0067	.0248	.0078	.22	1.3
North Brookfield	Doane Pond	.37	4.32	.0037	.0224	.0048	.20	1.1
	North Pond	.36	4.03	.0046	.0232	.0053	.20	1.1
Northfield	Reservoir	.31	4.20	.0018	.0085	.0014	.14	1.3
Norwood	Buckmaster Pond	.08	5.20	.0075	.0169	.0037	.45	1.7
Orange	Reservoir	.09	2.72	.0005	.0044	.0010	.12	1.1
Palmer (Fire District No. 1)	Lower Reservoir	.11	3.48	.0020	.0131	.0028	.16	1.1
PEABODY	Spring Pond	.17	6.28	.0139	.0152	.0026	.75	2.6
	Suntaug Lake	.05	6.56	.0160	.0180	.0038	.97	3.4
PITTSFIELD	Ashley Lake	.15	5.59	.0054	.0124	.0022	.13	3.2
	Ashley Brook	.16	6.81	.0049	.0101	.0014	.14	4.3
	Hathaway Brook	.07	10.22	.0021	.0065	.0016	.14	8.8
	Mill Brook	.31	5.23	.0023	.0122	.0031	.11	2.4
	Sacket Brook	.13	6.79	.0030	.0081	.0016	.16	5.3
	Farnham Reservoir	.47	5.47	.0036	.0167	.0025	.11	1.8
Plymouth	Little South Pond	.01	3.02	.0021	.0116	.0024	.63	0.4
	Great South Pond	.00	3.09	.0020	.0109	.0026	.64	0.4
Randolph	Great Pond	.25	6.39	.0020	.0154	.0029	.72	1.8
Rockport	Cape Pond	.18	10.37	.0015	.0162	.0040	3.57	2.3
Russell	Black Brook	.14	3.87	.0008	.0084	.0019	.12	1.6
Rutland	Muschapauge Lake	.05	4.07	.0011	.0111	.0015	.39	1.6
SALEM	Wenham Lake	.28	7.52	.0058	.0190	.0041	.78	2.8
	Longham Reservoir	.86	7.83	.0123	.0280	.0051	.87	2.4
	Ipswich River at pumping station	.38	11.28	.0132	.0144	.0036	.86	5.2
Shelburne (Shelburne Falls Fire District)	Fox Brook	.04	6.15	.0006	.0037	.0003	.08	3.7
Southbridge	Hatchet Brook Reservoir No. 3	.11	3.36	.0027	.0121	.0023	.20	1.0
	Hatchet Brook Reservoir No. 4	.18	3.22	.0040	.0149	.0029	.19	0.9
South Hadley (Fire District No. 1)	Leaping Well Reservoir	.05	3.95	.0043	.0116	.0048	.18	1.3
	Buttery Brook Reservoir	.07	5.64	.0093	.0128	.0036	.32	1.8
Spencer	Shaw Pond	.05	3.41	.0018	.0132	.0023	.19	0.9
SPRINGFIELD	Westfield Little River, filtered	.14	4.50	.0014	.0070	—	.15	1.4
Stockbridge	Lake Averic	.09	7.41	.0028	.0129	.0019	.14	5.5
Stoughton	Muddy Pond Brook	.17	4.50	.0006	.0071	.0013	.30	1.0
TAUNTON	Assawompsett Pond	.11	3.96	.0040	.0139	.0021	.47	0.8
	Elder's Pond	.03	4.45	.0037	.0121	.0021	.43	0.8
Wakefield	Crystal Lake	.14	7.73	.0066	.0176	.0029	.74	2.7
Wareham (Onset)	Jonathan Pond	.01	4.45	.0018	.0091	.0011	.67	0.6
Wayland	Snake Brook Reservoir	.68	5.35	.0053	.0232	.0050	.26	1.9
WESTFIELD	Montgomery Reservoir	.41	3.58	.0076	.0192	.0049	.14	0.7
	Tillotson Brook Reservoir	.07	3.67	.0024	.0049	.0007	.14	1.1
West Springfield	Bear Hole Brook	.08	7.57	.0063	.0087	.0026	.16	4.7
	Bear Hole Brook, filtered	.02	7.23	.0014	.0048	—	.17	4.6
West Stockbridge	East Mountain Reservoir	.07	6.81	.0005	.0050	.0008	.12	2.9
Weymouth	Great Pond	.20	3.85	.0012	.0138	.0027	.44	1.1
Williamsburg	Reservoir	.11	4.88	.0006	.0083	.0021	.12	2.4
Williamstown	Rattlesnake Brook	.02	12.02	.0005	.0040	.0011	.12	10.8
	Paul Brook	.00	5.65	.0013	.0040	.0004	.11	4.4
Winchester	North Reservoir	.02	4.74	.0020	.0131	.0028	.38	1.9
	South Reservoir	.04	4.17	.0041	.0124	.0035	.36	1.7
	Middle Reservoir	.07	3.86	.0026	.0156	.0021	.34	1.6
	Bottomly Reservoir	.49	7.60	.0052	.0185	.0029	.26	2.7
WORCESTER	Kent Reservoir	.09	4.70	.0025	.0137	.0024	.22	1.8
	Leicester Reservoir	.16	4.47	.0040	.0139	.0019	.23	1.6
	Mann Reservoir	.09	5.90	.0062	.0140	.0026	.25	1.9
	Upper Holden Reservoir	.36	5.05	.0081	.0191	.0041	.19	1.5
	Lower Holden Reservoir	.12	4.49	.0086	.0144	.0039	.17	1.8
	Kendall Reservoir	.60	5.61	.0404	.0225	.0045	.20	1.8
	Pine Hill Reservoir	.57	5.54	.0146	.0271	.0065	.24	1.6

Averages of Chemical Analyses of Ground-Water Sources for the Year 1925.

[Parts in 100,000.]

CITY OR TOWN.	Source.	Color.	Residue on Evaporation.	AMMONIA.		Chlorine.	NITROGEN AS —		Hardness.	Iron.
				Free.	Albuminoid.		Nitrates.	Nitrites.		
Acton (West and South Water Supply District)	Tubular wells	.00	8.45	.0004	.0028	.39	.1205	.0000	3.8	.007
Adams (Fire District)	Tubular wells	.00	14.60	.0010	.0009	.10	.0395	.0000	12.8	.005
Amesbury	Tubular wells	.10	15.29	.0075	.0039	.45	.0046	.0000	8.0	.364
Ashland	Tubular wells, old supply	.04	6.12	.0003	.0017	.59	.0007	.0000	2.2	.027
	Tubular wells, new supply	.00	6.59	.0008	.0036	.47	.0029	.0001	2.6	.011
ATTLEBORO	Wells	.00	6.20	.0010	.0043	.47	.0098	.0000	2.2	.007
Auburn	Tubular wells	.00	9.00	.0003	.0012	.48	.1980	.0000	3.6	.004
Avon	Wells	.00	6.83	.0002	.0017	.54	.0848	.0000	2.9	.007
Ayer	Large well	.00	7.27	.0013	.0025	.49	.0410	.0000	3.1	.017
	Tubular wells	.00	6.83	.0019	.0021	.31	.0063	.0001	3.6	.016
Barnstable	Tubular wells	.00	3.90	.0012	.0011	1.04	.0023	.0000	0.8	.014
Bedford	Large well	.00	4.49	.0004	.0026	.31	.0045	.0000	1.5	.004
Billerica	Wells	.06	10.80	.0007	.0042	.50	.0085	.0000	4.5	.026
Braintree	Filter-gallery	.00	16.07	.0015	.0046	1.72	.5667	.0001	5.6	.009
Bridgewater	Wells	.00	6.02	.0026	.0035	.76	.0303	.0001	2.0	.005
Brookline	Tubular wells and filter-gallery, filtered	.03	10.35	.0006	.0040	.80	.0340	.0000	4.7	.005
Canton	Springdale well	.01	6.60	.0004	.0016	.46	.0455	.0000	2.2	.007
	Well near Henry's Spring	.03	5.25	.0004	.0021	.46	.0517	.0000	2.0	.008
Chelmsford (North Chelmsford Fire District)	Tubular wells	.12	5.87	.0198	.0070	.42	.0318	.0002	2.1	.026
Chelmsford (Water District)	Tubular wells	.00	8.25	.0005	.0023	.60	.1277	.0009	3.1	.017
Cohasset	Tubular wells	.03	15.22	.0007	.0061	1.97	.2100	.0000	6.5	.007
	Dug well, filtered	.03	8.34	.0048	.0055	1.14	.0050	.0000	2.8	.012
Cummington	Tubular wells	.09	6.57	.0025	.0020	.10	.0000	.0001	3.6	.019
Dedham	Large well and tubular wells	.01	10.87	.0021	.0037	1.02	.1450	.0001	5.0	.011
Deerfield (Fire District)	Wells	.00	5.10	.0006	.0022	.11	.0027	.0000	2.5	.008
Douglas	Tubular wells	.00	5.27	.0004	.0017	.36	.0717	.0000	2.0	.007
Dracut (Water Supply District)	Tubular wells	.00	12.70	.0012	.0027	.66	.1625	.0000	6.0	.021
Dracut (Collinsville)	Tubular wells	.01	6.50	.0005	.0028	.34	.0202	.0000	2.5	.014
Dudley	Tubular wells	.00	4.50	.0006	.0015	.24	.0060	.0000	1.8	.005
Dunstable	Well	.00	5.72	.0005	.0026	.19	.0037	.0000	2.0	.006
Duxbury (Fire and Water District)	Tubular wells	.00	4.87	.0002	.0014	.80	.0077	.0000	0.9	.003
East Brookfield	Tubular wells	.00	3.17	.0004	.0020	.18	.0033	.0000	1.1	.004
Easthampton	Tubular wells	.00	7.37	.0001	.0015	.14	.0223	.0001	4.2	.005
Easton (North Easton Village District)	Well	.00	5.87	.0005	.0023	.51	.0738	.0000	2.1	.009
Edgartown	Large well	.00	4.00	.0001	.0007	.92	.0027	.0000	0.8	.003
Fairhaven	Old wells	.36	8.26	.0006	.0067	1.00	.0444	.0000	3.2	.023
	New wells	.00	8.70	.0000	.0050	1.24	.1800	.0002	2.6	.016
Foxborough (Water Supply District)	Tubular wells	.00	4.25	.0003	.0016	.46	.0470	.0000	1.8	.010
Framingham	Filter-gallery	.01	18.53	.0003	.0020	1.48	.1139	.0000	7.7	.024
Franklin	Tubular wells	.00	5.97	.0008	.0037	.55	.0410	.0000	2.0	.005
Grafton	Filter-gallery	.01	14.10	.0004	.0051	1.52	.2900	.0000	5.5	.005
Granville	Well	.00	3.90	.0005	.0021	.11	.0007	.0000	0.9	.005
Great Barrington	Well near Green River	.00	9.96	.0018	.0048	.11	—	—	9.0	.005
	Filter-gallery near Green River	.01	8.07	.0008	.0038	.10	—	—	6.5	.007
Greenfield	Well near Green River	.00	7.07	.0010	.0036	.09	.0025	.0000	4.3	.004
Groton	Large well	.00	7.23	.0005	.0021	.19	.0030	.0000	3.4	.019
Groton (West Groton Water Supply District)	Tubular wells	.02	5.47	.0007	.0016	.21	.0150	.0000	3.4	.051
Hingham	Wells	.07	6.62	.0036	.0049	.71	.0160	.0001	2.1	.007
Holliston	Large well	.33	5.68	.0034	.0147	.32	.0041	.0000	1.8	.027
Hopkinton	Tubular wells	.00	10.05	.0004	.0027	.65	.1700	.0000	4.6	.018
Kingston	Tubular wells	.00	5.03	.0003	.0019	.67	.0040	.0000	1.3	.013
Leicester (Water Supply District)	Wells	.06	6.83	.0003	.0043	.25	.0593	.0001	2.6	.009
Leicester (Cherry Valley and Rochdale Water District)	Wells	.16	5.50	.0044	.0136	.33	.0040	.0000	2.1	.010

Averages of Chemical Analyses of Ground-Water Sources, etc. — Continued.

[Parts in 100,000.]

CITY OR TOWN.	Source.	Color.	Residue on Evaporation.	AMMONIA.		Chlorine.	NITROGEN AS —		Hardness.	Iron.
				Free.	Albu- minoid.		Nitrates.	Nitrites.		
Littleton	Tubular wells	.00	5.47	.0001	.0015	.20	.0210	.0000	1.8	.004
LOWELL	Boulevard wells	.46	7.14	.0348	.0051	.38	.0187	.0001	2.6	.276
	(tubular)									
	Boulevard wells,	.05	6.04	.0006	.0024	.43	.0297	.0000	2.3	.024
	filtered									
	Wells	.01	11.05	.0004	.0017	1.71	.1500	.0000	4.3	.014
Manchester	Large well	.00	5.25	.0002	.0012	.29	.0432	.0000	1.7	.008
Mansfield (Water Sup- ply District)	Inlet of filter	.05	17.38	.0084	.0035	1.85	.0045	.0001	8.9	.127
Marblehead	Outlet of filter	.00	19.58	.0005	.0029	1.62	.0048	.0000	10.2	.008
	Well	.00	24.85	.0005	.0023	4.51	.0117	.0000	11.6	.007
Marion	Tubular wells	.00	5.40	.0002	.0023	.64	.0330	.0000	1.5	.004
Marshfield	Tubular wells at									
	Humarook Beach	.00	10.10	.0008	.0024	1.88	.0250	.0001	2.7	.006
	Old wells at Brant									
	Rock	.10	77.00	.0022	.0024	35.00	.0540	.0010	18.6	.067
Mattapoisett	Tubular wells	.02	7.05	.0014	.0026	1.03	.0647	.0000	2.7	.009
Medfield	Spring	.00	4.63	.0026	.0051	.26	.0030	.0000	1.2	.008
Medway	Wells	.00	7.60	.0017	.0025	.71	.0363	.0000	2.8	.007
Merrimac	Tubular wells	.00	8.82	.0002	.0015	.46	.0326	.0000	3.4	.008
Methuen	Tubular wells at									
	Harris Brook	.30	8.84	.0042	.0075	.46	.0269	.0001	3.5	.064
	Tubular wells at									
	Pine Island	.00	9.59	.0004	.0034	.65	.0803	.0002	5.9	.009
Middleborough (Fire District)	Well	.29	7.08	.0108	.0054	.56	.0347	.0000	2.7	.329
	Filtered Water	.09	6.65	.0011	.0030	.62	.0342	.0000	2.3	.036
Millbury	Well	.00	5.47	.0002	.0031	.34	.0490	.0000	2.3	.009
Millis	Spring	.00	12.10	.0007	.0021	.94	.2717	.0000	5.7	.007
Monson	Large well	.02	4.17	.0009	.0029	.17	.0040	.0000	1.3	.004
Monterey	Springs	.02	9.35	.0004	.0045	.12	.0032	.0000	7.9	.009
Nantucket	Wells at Wyers									
	Valley	.00	4.87	.0001	.0010	1.83	.0017	.0000	1.2	.008
Natick	Large well	.00	10.27	.0005	.0019	.89	.0448	.0000	5.2	.005
Needham	Wells	.00	8.11	.0005	.0018	.67	.1200	.0000	3.0	.008
	Hicks Spring	.00	9.80	.0003	.0021	.88	.3883	.0000	3.6	.004
NEWBURYPORT	Wells and Artichoke									
	River, filtered	.11	7.50	.0013	.0120	.62	.0182	.0001	2.8	.029
NEWTON	Tubular wells and									
	filter-gallery	.06	7.51	.0017	.0049	.52	.0403	.0000	3.2	.028
North Attleborough	Wells	.00	7.47	.0003	.0019	.51	.0390	.0000	2.7	.009
Northbridge	Tubular wells	.00	4.21	.0005	.0022	.31	.0050	.0001	1.4	.009
Norton	Tubular wells	.00	4.83	.0001	.0017	.34	.0033	.0000	1.3	.010
Norwood	Tubular wells	.07	10.18	.0080	.0038	.60	.0668	.0001	4.7	.048
Oak Bluffs	Springs	.00	5.40	.0000	.0008	.90	.0060	.0000	1.4	.005
Oxford	Tubular wells	.00	5.53	.0000	.0009	.34	.0437	.0000	1.9	.006
Palmer (Bondsville)	Tubular wells	.02	6.77	.0005	.0015	.26	.0323	.0000	2.3	.018
Pepperell	Tubular wells	.00	3.97	.0001	.0016	.19	.0023	.0000	1.4	.005
Provincetown	Tubular wells	.00	28.70	.0003	.0018	12.12	.0033	.0001	6.2	.023
Reading	Filter-gallery	.61	11.58	.0178	.0116	1.45	.0077	.0000	3.1	.237
	Filtered water	.29	17.62	.0004	.0080	1.41	.0060	.0001	9.0	.033
Salisbury	Old well	.12	7.20	.0013	.0039	.56	.0034	.0000	3.5	.014
	New well	.09	9.36	.0007	.0018	.54	.0030	.0000	5.2	.042
Seituate	Tubular wells	.00	15.18	.0002	.0024	2.61	.2080	.0000	5.5	.004
Sharon	Well	.00	16.65	.0004	.0010	2.76	.3900	.0000	8.2	.006
	Tubular wells	.00	6.30	.0001	.0011	.54	.0670	.0000	2.4	.011
Sheffield	Spring	.00	4.27	.0014	.0014	.10	.0033	.0001	1.9	.006
Shirley (Shirley Village Water District)	Well	.00	4.77	.0004	.0015	.40	.1575	.0000	1.6	.005
Shrewsbury	Tubular wells	.00	4.63	.0003	.0021	.40	.0337	.0000	2.2	.008
South Hadley (Fire District No. 2)	Large well	.00	4.23	.0004	.0019	.15	.0467	.0000	1.9	.004
Sunderland	Springs	.03	7.52	.0003	.0030	.16	.0016	.0000	3.9	.023
Tisbury	Well	.00	5.03	.0001	.0011	.94	.0027	.0000	0.8	.007
Uxbridge	Tubular wells	.00	5.90	.0009	.0017	.45	.0610	.0001	2.1	.015
Walpole	Tubular wells	.00	5.93	.0004	.0022	.39	.0463	.0000	2.4	.008
WALTHAM	Old well	.08	8.35	.0038	.0032	.71	.0110	.0000	4.1	.064
	New well	.00	7.90	.0009	.0031	.55	.0146	.0000	3.4	.005
Ware	Wells	.02	8.18	.0010	.0020	.48	.1330	.0001	3.1	.025
	Large well	.00	7.70	.0004	.0021	.50	.1567	.0000	3.0	.007
Wareham (Fire District)	Tubular wells	.00	3.92	.0006	.0014	.58	.0017	.0000	0.7	.008
Warren	Tubular wells	.00	4.07	.0007	.0026	.22	.0260	.0000	1.4	.005
Webster	Wells	.00	4.88	.0030	.0019	.31	.0082	.0000	1.9	.009
Wellesley	Tubular wells	.00	10.32	.0007	.0020	1.05	.0622	.0000	4.8	.011
	Well at Williams									
	Spring	.01	10.95	.0004	.0027	1.35	.0560	.0001	4.4	.008
	Filter-gallery	.00	11.02	.0006	.0025	1.13	.1087	.0000	4.9	.007

Averages of Chemical Analyses of Ground-Water Sources, etc. — Concluded.

[Parts in 100,000.]

CITY OR TOWN.	Source.	Color.	Residue on Evaporation.	AMMONIA.		Chlorine.	NITROGEN AS —		Hardness.	Iron.
				Free.	Albuminoid.		Nitrates.	Nitrites.		
Westborough . . .	Filter basin . . .	.00	3.84	.0020	.0098	.25	—	—	1.2	.009
West Brookfield . . .	Tubular wells . . .	.00	5.17	.0004	.0014	.25	.0093	.0000	1.4	.008
Westford . . .	Tubular wells . . .	.00	4.80	.0003	.0012	.22	.0065	.0000	2.1	.005
Weston . . .	Well at Warren Ave. . .	.25	7.95	.0020	.0102	.50	.0134	.0000	4.2	.013
	Tubular wells at Kendal Green . . .	.00	7.95	.0003	.0013	.61	.0650	.0000	3.2	.008
West Stockbridge . . .	Johnson's Spring . . .	.00	9.97	.0017	.0026	.10	.0020	.0000	7.3	.007
Williamstown . . .	Cold Spring . . .	.00	13.97	.0010	.0019	.08	.0393	.0000	13.7	.004
	Sherman Spring . . .	.00	11.50	.0004	.0022	.07	.0063	.0000	9.7	.006
Winchendon . . .	Old wells . . .	.08	4.35	.0009	.0043	.13	.0042	.0000	1.4	.038
	New wells . . .	.33	4.10	.0015	.0065	.10	.0037	.0000	1.3	.014
Woburn . . .	Filter-gallery . . .	.00	11.53	.0007	.0027	1.25	.0308	.0001	5.6	.005
Worthington (Fire District) . . .	Springs . . .	.00	3.73	.0007	.0027	.12	.0033	.0000	1.4	.017
Wrentham . . .	Tubular wells . . .	.00	4.63	.0003	.0011	.29	.0230	.0000	1.5	.007

CONSUMPTION OF WATER.

Records of the consumption of water determined either by pumping records or meter measurements are kept in a large majority of the cities and towns in the State, and the results of these observations are presented in the table which follows. The consumption of water per person has been obtained by dividing the average daily quantity used by the population as ascertained by the census of 1925. In some of the towns the per capita consumption appears to be excessive, and this is due usually either to the large number of summer visitors not enumerated in the population or to the use of large quantities of water for manufacturing purposes.

The available records are presented in the following table:

Average Daily Consumption of Water in Various Cities and Towns in 1925.

CITY OR TOWN.	Population, 1925.	Gallons.	Gallons per Inhabitant.	CITY OR TOWN.	Population, 1925.	Gallons.	Gallons per Inhabitant.
Metropolitan Water District . . .	1,303,018	128,349,800	99	Billerica . . .	4,913	296,000	60
Arlington . . .	24,943	1,576,400	63	Braintree . . .	13,193	939,000	71
Belmont . . .	15,256	1,047,600	69	Brockton . . .	65,343	3,397,000	52
Boston . . .	779,620	89,724,700	115	Brookline . . .	42,651	4,016,000	94
Chelsea . . .	47,247	3,660,400	77	Cambridge . . .	119,669	11,864,000	99
Everett . . .	42,072	5,281,000	126	Canton . . .	5,896	430,000	73
Lexington . . .	7,785	492,900	63	Chelmsford . . .	6,573	165,000	25
Malden . . .	51,789	2,968,400	57	Chicopee . . .	41,882	2,692,000	64
Medford . . .	47,627	2,507,600	53	Clinton . . .	14,180	1,014,000	72
Melrose . . .	20,165	1,253,800	62	Cohasset . . .	2,913	248,000	85
Milton . . .	12,861	604,000	47	Concord . . .	7,056	596,000	84
Nahant . . .	1,630	176,000	108	Danvers and Middleton . . .	13,465	1,487,000	110
Quincy . . .	60,055	4,478,200	75	Dartmouth . . .	9,026	113,000	13
Revere . . .	33,261	2,377,900	71	Dedham . . .	13,918	825,000	59
Somerville . . .	99,032	7,955,500	80	Dracut . . .	6,400	128,000	20
Stoneham . . .	9,084	574,000	63	Dudley . . .	4,594	202,000	44
Swampscott . . .	8,953	753,900	84	Duxbury . . .	1,688	116,000	69
Watertown . . .	25,480	1,887,500	74	East Brookfield . . .	929	34,000	37
Winthrop . . .	16,158	1,030,000	64	Easthampton . . .	11,587	850,000	73
Abington and Rockland . . .	13,848	545,000	39	East Longmeadow . . .	3,134	54,000	17
Acton . . .	2,387	106,000	44	Easton . . .	5,333	258,000	48
Acushnet . . .	4,135	70,000	17	Edgartown . . .	1,235	136,000	110
Adams . . .	13,525	1,333,000	99	Fairhaven . . .	10,827	397,000	37
Agawam . . .	6,290	123,000	20	Fall River . . .	128,993	7,037,000	55
Amesbury . . .	11,229	740,000	66	Falmouth . . .	4,694	543,000	116
Amherst . . .	5,972	616,000	103	Fitchburg . . .	43,609	4,556,000	104
Andover . . .	10,291	942,000	92	Foxborough . . .	4,934	413,000	84
Ashburnham . . .	2,159	99,000	46	Frammingham . . .	21,078	1,381,000	66
Ashland . . .	2,521	203,000	81	Franklin . . .	7,055	469,000	66
Athol . . .	9,602	826,000	86	Gardner . . .	18,730	839,000	45
Attleboro . . .	20,623	1,066,000	52	Gloucester . . .	23,375	1,740,000	74
Avon . . .	2,360	112,000	47	Grafton . . .	6,973	99,000	14
Ayer . . .	3,032	231,000	76	Greenfield . . .	15,246	1,518,000	100
Barnstable . . .	5,774	248,000	43	Groton . . .	2,428	205,000	84
Bedford . . .	1,514	68,000	45	Groveland . . .	2,485	52,000	21
Beverly . . .	22,685	1,434,000	63	Haverhill . . .	49,232	4,616,000	94
				Holliston . . .	2,812	124,000	44

Average Daily Consumption of Water in Various Cities and Towns in 1925
— Concluded.

CITY OR TOWN.	Population, 1925.	Gallons.	Gallons per Inhabit- ant.	CITY OR TOWN.	Population, 1925.	Gallons.	Gallons per Inhabit- ant.
HOLYOKE	60,335	7,193,000	119	PEABODY	19,870	3,280,000	165
Hudson	8,130	480,000	59	Pepperell	2,779	195,000	70
Ipawich	6,055	437,000	72	PITTSFIELD	46,877	6,364,000	136
Lancaster	2,678	106,000	40	Plainville	1,512	113,000	75
LAWRENCE	93,527	4,725,000	51	Plymouth	13,176	1,525,000	116
Lincoln	1,306	219,000	168	Provincetown	3,787	306,000	81
Littleton	1,411	46,000	33	Randolph and Hol-			
Longmeadow	3,333	150,000	45	brook	8,917	509,000	57
LOWELL	110,296	6,185,000	56	Reading	8,693	329,000	38
Ludlow	8,802	218,000	25	Rockport	3,949	293,000	74
LYNN	103,081	9,597,000	93	SALEM	42,821	5,494,000	128
Manchester	2,499	304,000	122	Salisbury	1,820	194,000	107
Mansfield	6,590	402,000	61	Saugus	12,743	630,000	49
Marblehead	8,214	670,000	82	Scituate	2,713	477,000	176
Marion	1,271	142,000	112	Sharon	3,119	266,000	85
MARLBOROUGH	16,236	662,000	41	Shirley	2,394	79,000	33
Mattapoisett	1,556	106,000	68	Shrewsbury	5,819	201,000	35
Maynard	7,857	332,000	42	Southbridge	15,489	869,000	56
Medfield	3,867	73,000	19	SPRINGFIELD	142,065	13,714,000	97
Medway	3,144	136,000	43	Stockbridge	1,830	250,000	137
Merrimac	2,349	145,000	62	Stoughton	7,857	470,000	60
Methuen	20,606	1,166,000	57	TAUNTON	39,255	3,504,000	89
Middleborough	9,136	321,000	35	Tisbury	1,431	239,000	167
Milford and Hopedale	17,946	908,000	51	Uxbridge	6,172	499,000	81
Millbury	6,441	269,000	42	Wakefield	15,611	763,000	49
Millis	1,791	78,000	44	Walpole	6,508	868,000	133
Montague and Erving	9,307	831,000	89	WALTHAM	34,746	2,143,000	62
Nantucket	3,152	328,000	104	Ware	8,629	329,000	38
Natick	12,871	638,000	50	Wareham	5,594	281,000	50
Needham	8,977	515,000	57	Warren	3,950	53,000	13
New BEDFORD	119,539	9,450,000	79	Webster	13,389	776,000	58
NEWBURYPORT	15,656	1,426,000	91	Wellesley	9,049	741,000	82
NEWTON	53,003	4,153,000	78	West Brookfield	1,314	58,000	44
NORTH ADAMS	22,717	115,000	51	WESTFIELD	19,242	2,240,000	116
North Andover	6,839	478,000	70	Westford	3,571	144,000	40
North Attleborough	9,790	549,000	56	Weston	2,906	196,000	67
Northbridge	10,051	817,000	81	West Springfield	15,326	1,899,000	124
North Brookfield	3,046	318,000	104	Weymouth	17,253	1,211,000	70
Norton	2,769	130,000	47	Whitman	7,857	259,000	33
Norwood	14,151	1,174,000	83	WOBURN	18,370	1,838,000	100
Oak Bluffs	1,314	183,000	139	WORCESTER	190,757	15,683,000	82
Orange	5,141	181,000	35	Wrentham	3,214	105,000	33

RAINFALL.

The average rainfall in the State for 1925 was 43.86 inches or 0.68 of an inch below the normal.

The following table shows the normal rainfall, the rainfall for the year 1925, and the excess or deficiency of precipitation in each month as compared with the normal:

MONTH.	Normal Rainfall (Inches).	Rainfall in 1925 (Inches).	Excess or Deficiency in 1925 (Inches).	MONTH.	Normal Rainfall (Inches).	Rainfall in 1925 (Inches).	Excess or Deficiency in 1925 (Inches).
January	3.80	3.82	+0.02	August	4.15	2.12	-2.03
February	3.62	2.23	-1.39	September	3.46	3.19	-0.27
March	3.97	5.47	+1.50	October	3.65	4.57	+0.92
April	3.69	2.64	-1.05	November	3.86	3.75	-0.11
May	3.60	2.49	-1.11	December	3.69	4.58	+0.89
June	3.30	4.20	+0.90				
July	3.75	4.80	+1.05	Totals	44.54	43.86	-0.68

FLOW OF STREAMS.

Sudbury River.

The average yield of the Sudbury River during the year 1925 was 797,000 gallons per day per square mile of drainage area or about 18.1 per cent below the normal for the past 51 years. The yield was above the normal in the months of February and December and less than normal in January, March, April, May, June, August, September and November, while in July and October it was about normal.

The average yield for the six driest months, June to November, inclusive, was 247,000 gallons per square mile per day or 33.8 per cent below the normal.

The following table shows the relation between the average daily yield of the

Sudbury River for each month in the year 1925 and the normal yield of that stream during the past 51 years. The drainage area of the Sudbury River above the point of measurement is 75.2 square miles.

Table showing the Average Daily Yield of the Sudbury River for Each Month in the Year 1925, in Cubic Feet per Second per Square Mile of Drainage Area, and in Million Gallons per Day per Square Mile of Drainage Area; also, Departure from the Normal.

MONTH.	NORMAL YIELD.		ACTUAL YIELD IN 1925.		EXCESS OR DEFICIENCY.	
	Cubic Feet per Second per Square Mile.	Million Gallons per Day per Square Mile.	Cubic Feet per Second per Square Mile.	Million Gallons per Day per Square Mile.	Cubic Feet per Second per Square Mile.	Million Gallons per Day per Square Mile.
January	1.735	1.122	.285	.184	-1.450	-.938
February	2.419	1.564	2.866	1.852	+ .447	+ .288
March	4.196	2.712	3.378	2.183	- .818	-.529
April	3.082	1.992	2.306	1.491	- .776	-.501
May	1.714	1.108	.899	.581	- .815	-.527
June . . . . .	.789	.510	.335	.217	- .454	-.293
July . . . . .	.317	.205	.370	.239	+ .053	+ .034
August . . . . .	.332	.215	.089	.057	- .243	-.158
September . . . . .	.350	.227	.061	.039	- .289	-.188
October . . . . .	.583	.377	.543	.351	- .040	-.026
November	1.112	.718	.898	.580	- .214	-.138
December	1.498	.968	2.888	1.867	+1.390	+ .899
Average for whole year	1.506	.973	1.233	.797	- .273	-.176

The rainfall on the Sudbury River watershed and the total yield expressed in inches in depth upon the watershed (inches of rainfall collected) for each of the past six years, 1920 to 1925, inclusive, together with the average for a period of fifty-one years, are given in the following table:

Rainfall, in Inches, received and collected on the Sudbury River Drainage Area.

MONTH.	1920.			1921.			1922.			1923.		
	Rain-fall.	Rain-fall collected.	Per Cent collected.	Rain-fall.	Rain-fall collected.	Per Cent collected.	Rain-fall.	Rain-fall collected.	Per Cent collected.	Rain-fall.	Rain-fall collected.	Per Cent collected.
January	3.26	.556	17.1	2.78	1.742	62.7	1.89	.577	30.5	7.64	2.779	36.4
February	6.49	1.239	19.1	4.10	1.361	33.2	3.25	1.316	40.5	2.31	1.507	65.3
March	4.45	9.262	207.9	2.72	4.050	148.8	5.35	4.587	85.7	3.25	5.659	173.9
April	5.19	5.017	96.6	5.30	1.973	37.2	1.63	3.371	207.1	5.35	4.197	78.4
May	3.45	3.292	95.6	3.23	2.957	91.6	5.39	3.126	58.0	1.01	2.099	207.3
June	6.67	2.929	43.9	3.82	.295	7.7	8.90	2.695	30.3	4.12	0.668	16.2
July	2.04	.506	24.9	6.86	1.822	26.6	3.21	1.287	40.1	2.94	0.118	4.0
August	1.78	-.070	-4.0	1.20	.105	8.7	4.85	.627	12.9	2.17	-0.130	-6.0
September	3.53	.110	3.1	1.88	-.099	-5.3	4.09	1.135	27.7	1.54	-0.099	-6.5
October	1.01	-.046	-4.6	1.12	-.175	-15.6	2.28	.486	21.3	5.71	0.707	12.4
November	5.68	1.154	20.3	7.95	1.152	14.5	1.34	.639	47.8	5.83	1.969	33.8
December	5.11	2.141	41.9	2.54	1.367	53.8	3.42	.730	21.4	4.96	3.921	79.1
Totals and averages	48.66	26.090	53.6	43.50	16.550	38.0	45.60	20.576	45.1	46.83	23.395	50.0

Rainfall, in Inches, received and collected on the Sudbury River Drainage Area—Concluded.

MONTH.	1924.			1925.			MEAN FOR FIFTY-ONE YEARS, 1875-1925.		
	Rain-fall.	Rain-fall collected.	Per Cent collected.	Rain-fall.	Rain-fall collected.	Per Cent collected.	Rain-fall.	Rain-fall collected.	Per Cent collected.
January	3.60	3.205	89.1	4.47	.328	7.4	4.02	2.001	49.7
February	2.56	1.193	46.7	2.20	2.985	136.0	4.03	2.541	63.1
March	2.66	3.462	130.0	5.69	3.895	68.4	4.29	4.839	112.6
April	5.49	5.268	96.1	2.95	2.570	87.2	3.64	3.439	94.6
May	3.22	2.495	77.6	2.45	1.036	42.2	3.28	1.977	60.2
June	1.49	.485	32.5	4.75	.374	7.9	3.30	.880	26.7
July	3.19	-.094	-2.9	5.35	.377	8.0	3.71	.365	9.8
August	4.73	0.207	4.4	1.25	.102	8.2	3.72	.383	10.3
September	5.67	0.706	12.4	3.19	.068	2.1	3.40	.390	11.5
October	0.11	0.011	10.0	4.41	.626	14.2	3.58	.673	18.8
November	2.51	0.286	11.4	3.17	1.001	31.6	3.78	1.240	32.8
December	1.73	0.489	28.4	5.76	3.330	57.8	3.78	1.728	45.7
Totals and averages	36.96	17.713	47.9	45.64	16.742	36.7	44.53	20.456	45.9

The following table gives the record of the yield of the Sudbury River watershed in gallons per day per square mile for each of the past six years and the mean for the past fifty-one years:

Yield of the Sudbury River Drainage Area in Gallons per Day per Square Mile.¹

MONTH.	1920.	1921.	1922.	1923.	1924.	1925.	Mean for Fifty- one Years, 1875-1925.
January	312,000	976,000	323,000	1,558,000	1,796,000	184,000	1,122,000
February	743,000	845,000	817,000	935,000	715,000	1,852,000	1,564,000
March	5,192,000	2,270,000	2,571,000	3,172,000	1,941,000	2,183,000	2,712,000
April	2,911,000	1,144,000	1,956,000	2,435,000	3,056,000	1,491,000	1,992,000
May	1,846,000	1,658,000	1,753,000	1,177,000	1,399,000	581,000	1,108,000
June	1,696,000	171,000	1,561,000	387,000	281,000	217,000	510,000
July	284,000	1,021,000	722,000	67,000	-52,000	239,000	205,000
August	-39,000	59,000	351,000	-73,000	116,000	57,000	215,000
September	64,000	-58,000	657,000	-57,000	408,000	39,000	227,000
October	-26,000	-98,000	272,000	397,000	6,000	351,000	377,000
November	669,000	667,000	370,000	1,140,000	166,000	580,000	718,000
December	1,200,000	766,000	409,000	2,198,000	274,000	1,867,000	968,000
Average for whole year	1,239,000	788,000	980,000	1,114,000	841,000	797,000	973,000
Average for driest six months	360,000	294,000	463,000	307,000	152,000	247,000	373,000

¹ The drainage area of the Sudbury River used in making up these records included water surfaces amounting to about 2 per cent of the whole area from 1875 to 1878, inclusive, subsequently increasing by the construction of storage reservoirs to about 3 per cent in 1879, to 3.5 per cent in 1885, to 4 per cent in 1894, and to 6.5 per cent in 1898. The drainage area also contains extensive areas of swampy land, which, though covered with water at times, are not included in the above percentages of water surfaces.

Nashua River.

The average yield of the South Branch of the Nashua River at the outlet of the Wachusett Reservoir in Clinton during the year 1925 was 854,000 gallons per day per square mile of drainage area, or about 21.7 per cent less than the average for the past 29 years, in only four of which was the yield lower than in 1925. The average yield for the six driest months was 386,000 gallons per square mile per day or 28.5 per cent below the normal, and in only seven of the past 29 years have lower yields for similar periods been recorded.

The following table shows the normal yield of the river by months for the past 29 years, the actual yield in the year 1925, and the excess or deficiency in each month. The drainage area of the Nashua River above the point of measurement was 119 square miles from 1897 to 1907 and 118.19 square miles from 1908 to 1913, inclusive. Since January 1, 1914, the city of Worcester has been diverting water from 9.35 square miles of this drainage area for the supply of that city, leaving the net drainage area 108.84 square miles. In the calculations of the yield, allowance has been made for water overflowing into the Wachusett drainage area from the area used by the city of Worcester, but no such overflows occurred during the past year.

Table showing the Average Daily Yield of the South Branch of the Nashua River for Each Month in the Year 1925, in Cubic Feet per Second per Square Mile of Drainage Area, and in Million Gallons per Day per Square Mile of Drainage Area: also, Departure from the Normal.

MONTH.	NORMAL YIELD.		ACTUAL YIELD IN 1925.		EXCESS OR DEFICIENCY.	
	Cubic Feet per Second per Square Mile.	Million Gallons per Day per Square Mile.	Cubic Feet per Second per Square Mile.	Million Gallons per Day per Square Mile.	Cubic Feet per Second per Square Mile.	Million Gallons per Day per Square Mile.
January	1.806	1.167	.488	.316	-1.318	- .851
February	2.031	1.313	2.424	1.566	+ .393	+ .253
March	4.096	2.648	3.473	2.245	- .623	- .403
April	3.452	2.232	2.228	1.440	-1.224	- .792
May	2.040	1.319	1.095	.708	- .945	- .611
June	1.262	.816	.613	.396	- .649	- .420
July . . . . .	.737	.477	.362	.234	- .375	- .243
August . . . . .	.607	.392	.301	.194	- .306	- .198
September . . . . .	.547	.354	.534	.345	- .013	- .009
October . . . . .	.695	.450	.676	.437	- .019	- .013
November	1.175	.759	1.235	.799	+ .060	+ .040
December	1.799	1.163	2.513	1.624	+ .714	+ .461
Average for whole year	1.686	1.090	1.321	.854	-.365	-.236

The rainfall on the Nashua River watershed and the total yield expressed in inches in depth upon the watershed (inches of rainfall collected) for each of the past six years, 1920 to 1925, inclusive, together with the average for the past 29 years, are given in the following table:

Rainfall, in Inches, received and collected on the Nashua River Drainage Area.

MONTH.	1920.			1921.			1922.		
	Rain-fall.	Rain-fall collected.	Per Cent collected.	Rain-fall.	Rain-fall collected.	Per Cent collected.	Rain-fall.	Rain-fall collected.	Per Cent collected.
January	3.17	1.153	36.4	2.67	2.521	94.3	2.40	1.058	44.0
February	6.26	1.210	19.3	4.07	1.719	42.2	3.77	1.624	43.0
March	4.26	8.356	196.0	2.87	4.477	156.1	6.21	5.960	96.0
April	6.13	6.031	98.4	6.51	3.329	51.1	2.19	4.108	187.6
May	4.01	3.695	92.1	3.01	3.695	123.0	4.78	3.511	73.5
June	6.07	3.317	54.6	3.75	.828	22.1	9.22	3.838	41.6
July	4.33	1.443	33.3	6.41	1.821	28.4	4.91	2.672	54.5
August	2.91	.584	20.1	1.94	.438	22.6	5.59	1.419	25.4
September	6.39	.931	14.6	2.35	.197	8.4	2.77	.891	32.2
October	.63	.731	116.1	2.00	.282	14.1	2.41	.774	32.1
November	5.49	2.246	40.9	7.31	1.366	18.7	1.59	.912	57.3
December	6.01	4.619	76.9	2.77	2.271	82.1	4.02	.987	24.5
Totals and averages	55.66	34.316	61.7	45.66	22.944	50.3	49.86	27.754	55.7

MONTH.	1923.			1924.			1925.			MEAN FOR TWENTY-NINE YEARS, 1897-1925.		
	Rain-fall.	Rain-fall collected.	Per Cent collected.	Rain-fall.	Rain-fall collected.	Per Cent collected.	Rain-fall.	Rain-fall collected.	Per Cent collected.	Rain-fall.	Rain-fall collected.	Per Cent collected.
January	7.95	3.146	39.6	4.23	3.346	79.2	3.68	.563	15.3	3.69	2.082	56.4
February	2.30	1.617	70.5	3.31	1.332	40.3	2.27	2.524	111.3	3.76	2.131	56.7
March	3.29	5.478	166.3	2.41	3.028	125.6	5.81	4.005	69.0	4.10	4.724	115.3
April	5.52	5.244	95.0	6.58	7.262	110.4	3.06	2.482	81.1	3.93	3.852	97.9
May	1.44	2.339	162.1	3.55	3.519	99.0	2.14	1.262	58.8	3.35	2.352	70.2
June	3.51	1.062	30.3	1.13	.775	68.4	3.97	.684	17.2	3.88	1.408	36.3
July	3.72	.529	14.2	2.60	.234	9.0	3.95	.417	10.6	4.13	.850	20.6
August	2.04	.264	12.9	4.61	.449	9.7	2.04	.347	17.0	3.94	.700	17.8
September	1.04	.159	15.3	4.79	.552	11.5	4.26	.596	14.0	3.70	.610	16.5
October	5.16	.766	14.9	0.09	.114	122.5	4.37	.779	17.8	3.15	.802	25.4
November	5.87	1.682	28.7	3.30	.476	14.4	3.43	1.878	40.2	3.62	1.311	36.2
December	5.07	3.062	60.4	2.03	.702	34.6	4.39	2.897	65.9	3.99	2.075	52.0
Totals and averages	46.91	25.348	54.0	38.63	21.789	56.4	43.37	17.934	41.3	45.24	22.897	50.6

The following table gives the record of the yield of the Nashua River watershed in gallons per day per square mile for each of the past six years and the mean for the past 29 years:

Yield of the Nashua River Drainage Area in Gallons per Day per Square Mile.¹

MONTH.	1920.	1921.	1922.	1923.	1924.	1925.	Mean for Twenty-nine Years, 1897-1925.
January	646,000	1,413,000	593,000	1,764,000	1,876,000	316,000	1,167,000
February	725,000	1,067,000	1,008,000	1,004,000	798,000	1,566,000	1,313,000
March	4,685,000	2,510,000	3,341,000	3,071,000	1,697,000	2,245,000	2,648,000
April	3,498,000	1,931,000	2,383,000	3,042,000	4,213,000	1,440,000	2,232,000
May	2,071,000	2,071,000	1,968,000	1,311,000	1,973,000	708,000	1,319,000
June	1,922,000	480,000	2,223,000	615,000	449,000	396,000	816,000
July	809,000	1,021,000	1,498,000	297,000	131,000	234,000	477,000
August	327,000	246,000	795,000	148,000	252,000	194,000	392,000
September	540,000	114,000	516,000	92,000	320,000	345,000	354,000
October	409,000	158,000	434,000	430,000	64,000	437,000	450,000
November	1,301,000	791,000	528,000	974,000	276,000	799,000	759,000
December	2,590,000	1,273,000	553,000	1,717,000	394,000	1,624,000	1,163,000
Average for whole year	1,629,000	1,092,000	1,321,000	1,207,000	1,035,000	854,000	1,090,000
Average for driest six months	870,000	468,000	723,000	424,000	239,000	386,000	540,000

¹ The drainage area used in making up these records included water surfaces amounting to 2.2 per cent of the whole area from 1897 to 1902, inclusive, to 2.4 per cent in 1903, to 3.6 per cent in 1904, to 4.1 per cent in 1905, to 5.1 per cent in 1906, to 6 per cent in 1907, to 7 per cent in 1908, 1909 and 1910, to 6.5 per cent in 1911, to 6.8 per cent in 1912, to 7 per cent in 1913, to 7.4 per cent in 1914 and 1915, to 7.6 per cent in 1916, to 7.4 per cent in 1917 and 1918, to 7.5 per cent in 1919, 1920, 1921 and 1922, to 7.4 per cent in 1923 and 1924, and 6.4 per cent in 1925.

Merrimack River.

The Merrimack River at Lawrence, where the flow of the stream has been measured for many years, has a total drainage area of 4,663 square miles which includes 118.19¹ square miles tributary to the South Branch of the Nashua River, 75.2 square miles on the Sudbury River, and 18 square miles tributary to Lake Cochituate, or a combined area of about 211 square miles from which water is drawn at the present time for the supply of the Metropolitan Water District. The flow as measured at Lawrence includes the water wasted from these drainage areas. In the year 1925 most of the water of the Lake Cochituate drainage area and all of that of the southern Sudbury River drainage area was wasted into the stream, but no water whatever was wasted from the Wachusett Reservoir on the Nashua River, excepting such as was discharged from the reservoir under the provisions of the Metropolitan water supply act and agreements thereunder. Records of the quantity of water wasted from the Sudbury and Nashua River reservoirs have been kept by the Metropolitan District Commission and its predecessors, and these quantities have been deducted from the flow of the Merrimack River as measured at Lawrence. In presenting the record of the flow of the river, these three drainage areas have been deducted so that the net drainage area above Lawrence was 4,567 square miles in 1880, 4,570 square miles in the years 1881 to 1897, inclusive, and 4,452 square miles since the latter year.

The average flow of the Merrimack River during the year 1925 amounted to 1.321 cubic feet per second or 854,000 gallons per day per square mile of drainage area, or about 10.1 per cent below the normal flow for the past 46 years for which records are available. The flow was in excess of the normal during the months of February, March and December, and less than the normal in the other months of the year.

The following table shows the relation between the normal flow of this stream during the past 46 years and the actual flow during each month of the year 1925:

Table showing the Average Monthly Flow of the Merrimack River at Lawrence for the Year 1925, in Cubic Feet per Second per Square Mile of Drainage Area; also, Departure from the Normal.

MONTH.	Normal Flow, 1880-1925.	Actual Flow in 1925.	Excess or Deficiency.
January	1.258	.357	— .901
February	1.354	1.882	+ .528
March	2.768	3.413	+ .645
April	3.531	3.102	— .429
May	2.243	1.349	— .894
June	1.258	.689	— .569
July . . . . .	.764	.712	— .052
August . . . . .	.648	.518	— .130
September . . . . .	.640	.454	— .186
October . . . . .	.790	.735	— .055
November	1.092	1.067	— .025
December	1.279	1.577	+ .298
Average for whole year	1.469	1.321	— .148

The following table gives the record of the flow of the Merrimack River at Lawrence for each of the past six years, together with the average flow for the past forty-six years, this amount being expressed in cubic feet per second per square mile of drainage area:

¹ Including 9.35 square miles from which water is drawn for the supply of the city of Worcester.

Flow of the Merrimack River at Lawrence in Cubic Feet per Second per Square Mile.

MONTH.	1920.	1921.	1922.	1923.	1924.	1925.	Mean for Forty-six Years, 1880-1925.
January . . . . .	.570	1.679	.830	1.074	1.964	.357	1.258
February . . . . .	.618	.995	.887	.855	.978	1.882	1.354
March	4.082	3.689	3.900	1.956	1.767	3.413	2.768
April	6.002	2.700	4.903	4.958	5.050	3.102	3.531
May	3.545	1.957	2.887	2.904	3.115	1.349	2.243
June	1.607	.597	3.006	.730	.920	.689	1.258
July . . . . .	.746	1.031	2.111	.434	.464	.712	.764
August . . . . .	.678	.683	.773	.394	.350	.518	.648
September . . . . .	.680	.425	.766	.303	.753	.454	.640
October	1.051	.475	.660	.491	.612	.735	.790
November . . . . .	.921	1.057	.612	1.177	.536	1.067	1.092
December	3.258	1.652	.498	2.372	.712	1.577	1.279
Average for whole year	1.980	1.412	1.819	1.471	1.435	1.321	1.469
Average for driest six months . . . . .	.947	.711	.903	.588	.571	.696	.865

Sudbury, Nashua and Merrimack Rivers.

The following table shows the weekly fluctuations during the year 1925 in the yield of the Sudbury River at Framingham, the South Branch of the Nashua River at the outlet of the Wachusett Reservoir in Clinton, and the Merrimack River at Lawrence. The flow of these streams, particularly that of the Sudbury River and the South Branch of the Nashua River, serves to indicate the flow of other streams in eastern Massachusetts. The area of the Sudbury River watershed is 75.2 square miles, of the South Branch of the Nashua River 118.19 square miles, and of the Merrimack River at Lawrence 4,452 square miles.

Table showing the Average Weekly Flow of the Sudbury, South Branch of the Nashua and the Merrimack Rivers for the Year 1925, in Cubic Feet per Second per Square Mile of Drainage Area.

WEEK ENDING SUNDAY —	Yield of Sudbury River.	Yield of South Branch, Nashua River.	Flow of Merrimack River.	WEEK ENDING SUNDAY —	Yield of Sudbury River.	Yield of South Branch, Nashua River.	Flow of Merrimack River.
Jan. 4 . . . . .	.011	.323	.405	July 5	1.013	.709	.717
11 . . . . .	.007	.329	.388	12 . . . . .	.481	.436	.490
18 . . . . .	.022	.514	.371	19 . . . . .	.651	.157	.447
25	1.276	.460	.361	26 . . . . .	.010	.298	.830
Feb. 1 . . . . .	.820	.702	.321	Aug. 2	1.001	.560	1.153
8 . . . . .	.706	.396	.388	9 . . . . .	.549	.760	.561
15	6.772	6.147	2.729	16 . . . . .	.218	.355	.563
22	7.108	1.634	2.681	23 . . . . .	.888	.097	.505
Mar. 1	2.590	2.478	1.949	30 . . . . .	.841	— .012	.374
8	3.880	3.369	2.073	Sept. 6 . . . . .	.604	.975	.314
15	2.795	2.730	2.913	13 . . . . .	.896	.558	.278
22	3.861	4.097	3.813	20 . . . . .	.646	.532	.640
29	2.599	2.713	3.164	27	— .333	.182	.531
Apr. 5	5.091	3.161	7.071	Oct. 4 . . . . .	.235	.443	.432
12	1.583	1.574	2.584	11	1.264	.557	.551
19	2.683	2.711	2.195	18 . . . . .	.996	.565	.750
26	5.154	2.593	2.848	25 . . . . .	.587	.826	.808
May 3	1.441	1.606	2.350	Nov. 1 . . . . .	.822	.743	1.053
10	1.004	1.185	1.819	8 . . . . .	.521	.698	.688
17	1.028	1.173	1.338	15 . . . . .	.931	1.952	1.373
24 . . . . .	.378	.816	1.127	22	2.614	1.454	1.620
31	1.016	1.035	.856	29	2.675	.979	.669
June 7 . . . . .	.880	.903	1.004	Dec. 6	4.290	5.261	1.587
14 . . . . .	.793	.277	.628	13	6.896	2.348	2.735
21 . . . . .	.345	.426	.556	20	2.643	1.262	1.154
28 . . . . .	.427	.567	.522	27	2.605	1.878	1.118

EXAMINATION OF RIVERS.

Aberjona River.

The results of the analyses of samples of water from the Aberjona River during the past year have shown an increase in pollution in portions of the course, while other portions have been less objectionable than formerly because of a decrease

in the quantity of industrial wastes discharged into the stream. Acting under the provisions of Chapter 16 of the Resolves of 1925, entitled, "Resolve providing for investigations and reports by the Metropolitan District Commission and the Department of Public Health relative to a sewer extension and sewage conditions in the valley of the Aberjona River and its tributaries," the Department has made a further investigation of the pollution of the river and its tributaries, the results of which will be reported to the Legislature as required.

Assabet River.

The results of the analyses of samples of water from this river show that it is annually becoming more objectionable throughout its course below Westborough. This increase in pollution is due in part to the overflow of sewage from the sewage disposal works at Westborough and elsewhere and in part to the discharge of industrial wastes into the stream at many points, chiefly at Hudson and Maynard.

Blackstone River.

The Blackstone River immediately below Worcester but above the sewage disposal works has shown evidence of a considerable increase in pollution and a further increase in the pollution of the river has been noted below the disposal works down to the State line. The new sewage disposal works of the city of Worcester were put into operation on June 25, 1925. The works have been in constant operation since that date but it is as yet too early to determine their probable effect in improving the condition of the river.

Charles River.

There has been a marked increase in the pollution of the Charles River during the past year and complaint has been made regarding its condition. An increase of microscopic and plant growths has been reported which is no doubt due to the increase in pollution of the stream. While the analyses show a slight improvement immediately below Milford, the river in that part of its course is still very objectionable in the drier part of the year. Steps are being taken to straighten the course of the river in and below Milford, and recommendations have been made by the Department relative to the removal of certain sources of pollution. Mine Brook below Franklin is also considerably polluted.

Chicopee River.

The analyses of the water of the Quaboag River, one of the main tributaries of the Chicopee River, show that there has been a slight increase in pollution during the year.

The Ware River for the most part shows very little change and the same is true of the Chicopee River below the junction of its three main tributaries.

Concord and Sudbury Rivers.

The Sudbury River below Saxonville in the town of Framingham is polluted by industrial wastes discharged into the stream in that village as well as by sewage discharged into a tributary from sewage disposal works above, and its pollution at this point was marked throughout most of the year. The condition of the Concord River at its mouth in Lowell shows an increase in pollution.

Connecticut River.

The examinations of the Connecticut River have shown it to be in about the same condition as in other recent years.

Mill River at its mouth shows a decided increase in pollution due to the sewage of the city of Northampton, and the Manhan River shows evidence of a slight increase in pollution due to sewage from Easthampton.

French River.

The condition of the French River has been very objectionable below Webster, due to the industrial wastes and sewage discharged into the stream from that town and from the adjacent town of Dudley. The increase in pollution in the past year has been more marked than for several years. Investigations were completed early in the year relative to the construction of an intercepting sewer and of sewage

disposal works and the plans for works for the treatment of the sewage were approved by this Department on April 27. The towns appear to have taken no further definite action to improve the condition of this river.

Hoosick River.

The results of analyses of samples of water collected from this river at various points show very little change in its condition and the stream continues to be one of the most seriously polluted rivers in the State. A plan was submitted to the Department by the city authorities of North Adams early in the year relative to establishing another sewer outlet into the river below North Adams. The Department found the plan an objectionable one and recommended a further engineering study in order that the proposed sewer may be made a part of a general plan for the removal of the sewage of North Adams from the river.

Housatonic River.

The condition of the Housatonic River below Pittsfield has shown no marked improvement over that of last year. The city of Pittsfield has installed new pumping machinery at its sewage pumping station and during the latter part of the year less sewage than formerly has been discharged into the stream.

Merrimack River.

The examinations of the waters of the Merrimack River have been continued as usual during the months from June to November, inclusive, the results showing evidence of a continued increase in pollution especially below Lawrence.

Investigation of a complaint relative to the condition of the Shawsheen River below Andover showed that the river was not in an objectionable condition at the time of the examinations although there was some evidence of earlier pollution by sewage and industrial wastes.

Millers River.

The Otter River below Gardner, a branch of the Millers River, has shown evidence of considerable pollution by imperfectly purified sewage discharged from the Templeton area of the Gardner sewage disposal plant, and the Department has recommended certain changes in the sewerage system and sewage disposal works at Gardner. An increase in pollution was shown by the analyses of samples of water collected from the river below Winchendon but farther down stream there has been but little change.

Nashua River.

The North Branch of the Nashua River below Fitchburg but above the sewage disposal works still shows evidence of serious pollution and the condition of the river as a whole is objectionable. Monoosnock Brook which receives the sewage of the city of Leominster has been, as usual, grossly polluted. Below Monoosnock Brook the North Branch of the Nashua River has shown but little change from previous years. The South Branch of the Nashua River at its mouth has shown evidence of serious pollution during the past year, due largely to the overflow of sewage from the Clinton sewerage system and to the discharge of poorly purified effluent from the Clinton sewage disposal works. The Nashua River below the confluence of the two branches has been in about the same condition as in previous years.

The condition of the North Branch of the Nashua River has been the cause of considerable complaint and an investigation of its pollution by industrial wastes is under way. The condition of the river as a whole is very objectionable.

Neponset River.

The inspection and analyses of this stream show that it is rapidly approaching the objectionable condition of earlier years and at many stations the condition of the stream during the past six months, June to November, has been worse than at any time since the war. There has been an increase in pollution above the paper mills at East Walpole and a decided increase below these paper mills, which is true also of Hawes Brook at the mouth and the river below Hawes Brook. Conditions have been more objectionable than usual at the lower end of the Fowl

Meadows and the dissolved oxygen in the water had been exhausted at this point when examined in July, August and September. The east branch or Canton River also shows an increase in pollution below Canton and also below Stoughton.

Taunton River.

The condition of the Taunton River and its principal tributaries has shown little change as compared with recent years, although below Taunton examinations have shown that the pollution continues to increase.

EXAMINATION OF SEWAGE DISPOSAL WORKS.

During the early part of the year a change was made in the method of operating the sewage disposal works of the city of Attleboro whereby the sewage has been distributed more thoroughly over the entire area. The sewage now discharged at the disposal works is stronger than formerly.

At Brockton the new disposal works, consisting of four settling tanks and two acres of trickling filters, have been used for the filtration of practically all the sewage throughout the year. During the last half of the year the effluent from the secondary tanks has been discharged upon sand filter beds which have been reconstructed to serve as strainer beds. The improvement in the condition of the Coweaset River since the refiltration of the secondary effluent has been very marked.

The quantity of sewage discharged upon the filter beds at Clinton has, as usual, been greater than the filters are capable of treating satisfactorily and considerable quantities have overflowed into the South Branch of the Nashua River without treatment. This plant shows no improvement over its condition in recent years.

At Framingham the new Imhoff tank and eight acres of new sand filters have been in use during most of the year. The extension of the sewerage system to Framingham Center and Saxonville has materially increased the flow of sewage.

The Franklin sewage disposal works have operated satisfactorily during the year but a more thorough distribution of the sewage will be found desirable in the future.

The condition of the sewage disposal works at Gardner has remained about the same as in previous years. The purification of the sewage has not been satisfactory and the discharge of improperly purified effluent into the Otter River has been the cause of complaint. The Department has recommended an investigation of the sewerage system and sewage disposal works with a view to improving their efficiency.

At Hudson the sewage disposal works have operated satisfactorily during the year. The new pumps which were installed during the latter part of 1924 have been adequate to take care of all the sewage flowing from the town.

At Milford the new sewage disposal works, consisting of Imhoff tanks and a trickling filter with an area of 0.28 of an acre, which were put into operation in July 1924, have been operated during the greater part of the year. The secondary tank and necessary pumps have not as yet been used and for this reason a considerable quantity of poorly purified sewage has been discharged from this section of the plant into the Charles River. The sand filters have been operated satisfactorily during the year.

At Natick the conditions remain about the same as in previous years. The filters continue to be inadequate for the treatment of all the sewage of the town and are badly overloaded during the greater part of the year. There has been more or less overflow of untreated sewage through the underdrainage system directly into Bannister Brook, a tributary of the Sudbury River. An improvement of the sewers and an enlargement of the disposal works of this town are greatly needed and these improvements should be carried out without further delay.

At Norwood the new sand filters constructed in 1924 have been in regular use, but the area of filters is inadequate for the proper treatment of all the sewage of the town and additional filters should be constructed as previously recommended by the Department.

The sewage disposal works at Pittsfield are rapidly becoming inadequate for the effective treatment of the sewage discharged from the city. The new sewage pumping machinery, consisting of two motor driven centrifugal pumps, was installed during the summer and since that time less raw sewage has been dis-

charged into the Housatonic River than in other recent years. Investigations relative to the reconstruction and extension of the filter beds are now under way.

At Southbridge the sewage disposal plant is inadequate for the disposal of the sewage of the town of Southbridge and much sewage is allowed to overflow into the Quinebaug River without treatment. During the year the construction of six new filter beds was begun and at the end of the year the work was nearing completion.

At Worcester the new sewage disposal works, constructed under the provisions of Chapter 171 of the Special Acts of 1919 as amended by Chapter 141 of the Acts of 1924, were so far completed as to be put into operation on June 25, within the time specified by the latter act. The use of the old plant has been discontinued. The new works which are located south of the old sand filters consist of a grit chamber 129 x 22 feet in plan in two compartments, 12 double storied Imhoff tanks each 90 x 60 feet in plan, 4 pairs of dosing tanks, 14 acres of trickling filters 10 feet deep, and 4 secondary settling tanks each 120 x 60 feet in plan. A new laboratory has also been provided. It is too early to determine the efficiency of the new works at this time.

The average results of the analyses of sewage and effluent, together with statistics concerning the more important sewage disposal works, are presented in the following tables:

TABLE No. 1. — Average Results of the Analyses of Monthly Samples of Crude Sewage as received at Disposal Works. (Fats determined in about 73 Per Cent of the Samples.)
[Parts in 100,000.]

CITY OR TOWN.	RESIDUE ON EVAPORATION.					AMMONIA.					Chlorine.	OXYGEN CONSUMED.		IRON.		Kjeldahl Nitrogen.	Fats.
	TOTAL RESIDUE.			LOSS ON IGNITION.		Free.	ALBUMINOID.		Unfil-tered.	Fil-tered.		Unfil-tered.	Fil-tered.				
	Total.	Dis-solved.	Sus-pended.	Total.	Dis-solved.		Sus-pended.										
ATTLEBORO ¹	51.30	34.37	16.93	25.27	13.27	12.00	3.91	.70	.32	.38	5.00	5.50	2.92	.517	.141	1.61	—
BROCKTON ²	52.60	33.43	19.17	28.65	12.47	16.18	5.23	.79	.34	.45	7.24	6.07	2.67	.153	.056	1.89	9.15
Clinton ²	177.60	80.45	97.15	116.57	39.45	77.12	3.88	1.84	.79	1.05	6.75	19.38	10.28	.217	.083	4.04	58.66
Concord ¹	39.00	31.10	7.90	21.56	13.57	7.99	3.21	1.01	.64	.37	5.57	3.20	2.38	.086	.058	1.19	—
Easthampton ¹	71.10	47.65	23.45	39.25	17.90		4.92	.70	.32	.38	5.70	5.80	2.38	.143	.068	1.53	—
FITCHBURG	55.11	33.27	21.84	27.71	13.82	13.89	2.32	.51	.28	.23	5.56	5.05	2.91	.548	.172	1.23	7.28
Frammingham (Imhoff) ³	64.75	47.15	17.60	32.22	19.45	12.77	3.98	.85	.54	.31	9.09	6.51	3.95	.132	.075	1.71	7.06
Frammingham ²	102.73	57.96	44.77	56.31	26.11	30.20	4.03	1.34	.78	.57	10.34	11.59	5.29	.254	.086	11.59	20.77
Franklin	36.44	25.24	11.20	17.72	9.48	8.24	3.30	.47	.30	.17	4.26	5.06	2.38	.080	.033	1.10	—
GARDNER (Gardner Area) ⁴	79.70	50.95	28.75	44.00	22.05	21.95	7.80	1.25	.75	.50	9.70	11.05	5.45	.141	.055	3.20	15.32
GARDNER (Templeton Area)	69.77	42.50	27.27	38.27	17.55	20.72	7.99	1.18	.59	.59	7.81	7.74	3.88	.183	.070	2.49	8.44
Hopedale ^{1, 2}	73.96	46.68	27.28	42.64	21.32	21.32	7.70	1.15	.60	.55	8.96	8.78	4.42	.295	.066	2.57	—
Hudson ²	85.85	49.33	36.52	51.38	19.47	31.91	10.47	1.42	.69	.73	9.70	10.75	4.63	.141	.055	3.14	14.32
Leicester ⁴	32.30	26.25	6.05	17.25	12.45	4.80	1.80	.46	.23	.23	3.08	4.15	3.53	.087	.030	.88	—
Marion ¹	34.87	26.73	8.14	18.87	12.06	6.81	2.33	.31	.19	.12	4.83	3.32	1.78	.080	.040	.95	—
MARLBOROUGH	103.20	65.65	37.55	58.80	27.88	30.92	4.82	1.30	.67	.63	14.38	10.49	5.13	.286	.115	3.04	16.85
Milford ⁵	76.34	47.82	28.52	41.76	17.80	23.96	5.44	.88	.34	.54	9.26	8.20	3.88	.158	.069	1.96	—
Natick	66.12	48.10	18.02	28.65	14.45	14.20	4.03	.54	.26	.28	11.62	5.04	2.64	.112	.049	1.30	7.02
North Attleborough ¹	29.23	25.33	3.90	13.30	9.90	3.40	1.65	.30	.17	.13	3.87	2.39	1.47	.082	.050	.76	—
Northbridge ¹	41.20	27.83	13.37	22.93	13.43	9.50	5.03	.74	.39	.35	3.62	5.82	2.78	.111	.059	1.91	—
Norwood	92.92	64.83	28.09	42.25	21.42	20.83	3.70	.64	.30	.34	17.16	10.17	6.36	.151	.065	1.74	10.15
Pittsfield ²	43.88	35.30	8.58	18.73	13.27	5.46	2.46	.39	.22	.17	5.91	3.66	2.45	.091	.040	.89	3.50
Southbridge ¹	66.56	46.97	19.59	37.73	21.80	15.93	3.88	.78	.31	.47	7.23	7.28	3.25	.159	.060	1.79	12.16
Stockbridge	25.70	24.20	1.50	10.05	9.50	0.55	1.58	.24	.14	.10	2.27	1.91	1.26	.037	.026	.47	—
Westborough	81.67	60.37	21.30	40.65	23.40	17.25	3.50	.67	.34	.33	11.72	10.82	6.21	.160	.078	1.67	13.14
WORCESTER (day) ⁶	103.60	66.33	37.27	43.27	15.40	27.87	3.24	.70	.24	.46	12.27	16.80	5.36	3.667	.253	2.29	—
WORCESTER (night) ⁶	116.00	81.20	34.80	49.47	25.60	23.87	2.20	.86	.34	.52	9.07	16.80	7.00	11.467	5.050	2.45	—

¹ Six samples.² At pumping station.³ Entrance to Imhoff tanks, including Saxonville sewage.⁴ Four samples.⁵ Ten samples.⁶ Three samples (Jan., Feb., April).

TABLE No. 2. — *Average Results of the Analyses of Monthly Samples of Sewage as applied to Filter Beds after Preliminary Treatment as Indicated. (Fats determined in about 73 Per Cent of the Samples.)*

[Parts in 100,000.]

CITY OR TOWN.	Form of Preliminary Treatment.	RESIDUE ON EVAPORATION.						AMMONIA.			OXYGEN CONSUMED.		IRON.		Kjeldahl Nitrogen.	Fats.	
		TOTAL RESIDUE.			LOSS ON IGNITION.			Free.	ALBUMINOID.		Unfiltered.	Filtered.	Unfiltered.	Filtered.			
		Total.	Dissolved.	Suspended.	Total.	Dissolved.	Suspended.										
ATLEBORO ¹	None	51.30	34.37	16.93	25.27	13.27	12.00	3.91	.70	.32	.38	5.00	2.92	.517	.141	1.61	—
BROCKTON	Tanks	44.58	36.80	7.78	20.03	13.38	6.65	4.55	.53	.31	.22	7.80	4.34	.261	.130	.197	4.03
CLINTON	Basins	58.11	49.18	8.93	28.13	21.78	6.35	3.15	.60	.40	.20	5.14	6.30	5.03	.135	.085	1.29
CONCORD ¹	None	39.00	31.10	7.90	21.56	13.57	7.99	3.21	1.01	.64	.37	5.57	2.38	.086	.058	1.19	—
EASTHAMPTON ¹	Tanks	57.10	39.95	17.15	32.10	17.25	14.85	5.79	.71	.33	.38	5.60	5.65	2.93	.115	.049	1.63
FITCHBURG	Imhoff	35.98	30.71	5.27	15.31	12.09	3.22	2.41	.36	.24	.12	5.59	3.57	2.79	.268	.177	.75
FRAMINGHAM	Imhoff	50.00	42.87	7.13	22.05	16.53	5.52	4.26	.53	.35	.18	7.38	4.46	2.92	.153	.085	1.20
FRANKLIN ¹	Tanks	29.20	26.73	2.47	10.30	8.60	1.70	2.67	.28	.19	.09	5.12	2.01	1.47	.070	.043	0.65
GARDNER (Gardner Area)	None	79.70	50.95	28.75	44.00	22.05	21.95	7.80	1.25	.75	.96	9.70	11.05	5.45	.141	.055	3.20
GARDNER (Templeton Area)	Tanks	42.10	35.20	6.90	18.72	13.30	5.42	3.98	.44	.25	.19	6.88	3.74	2.46	.128	.076	.98
HOPEDALE ¹	Tanks	42.33	31.73	10.60	20.63	12.73	7.90	4.88	.49	.30	.19	6.02	4.07	2.65	.137	.074	1.19
HUDSON	Tanks	50.13	40.95	9.18	23.93	16.75	7.18	5.05	.52	.32	.20	7.88	4.76	2.97	.088	.056	1.19
LEICESTER ²	None	32.30	26.25	6.05	17.25	12.45	4.80	1.80	.46	.23	.23	3.08	4.15	3.53	.087	.030	.88
MAIRION ¹	None	34.87	26.73	8.14	18.87	12.06	6.81	2.33	.31	.19	.12	4.83	3.32	1.78	.080	.040	.95
MAULBOROUGH	Tanks	68.03	54.92	13.11	31.86	20.52	11.34	6.90	.82	.42	.40	11.92	6.34	3.45	.242	.136	1.63
MILFORD ³	Tanks	49.46	39.08	10.38	22.12	14.00	8.12	4.72	.45	.23	.22	7.67	4.05	2.68	.120	.058	1.11
MILFORD	Imhoff	49.29	40.89	8.40	22.93	16.29	6.64	4.44	.50	.26	.24	6.96	4.48	3.12	.095	.055	1.14
NATICK	None	66.12	48.10	18.02	28.65	14.45	14.20	4.03	.54	.26	.28	11.62	5.04	2.64	.112	.049	1.30
North Attleborough ¹	Tanks	28.10	25.82	2.28	10.80	9.20	1.60	1.92	.28	.16	.12	4.68	2.11	1.55	.071	.046	.61
Northbridge ¹	Tanks	23.07	19.40	3.67	10.97	8.03	2.94	2.34	.31	.19	.12	3.32	2.57	1.72	.083	.058	.76
Norwood	Tank	82.12	58.75	23.37	35.17	17.62	17.55	3.76	.75	.30	.45	16.10	7.77	4.33	.150	.061	1.74
PITTSFIELD	None	43.88	35.30	8.58	18.73	13.27	5.46	2.46	.39	.22	.17	5.91	3.66	2.45	.091	.040	.89
Southbridge ¹	Tanks	59.56	49.40	10.16	30.03	21.13	8.90	5.54	.65	.36	.29	9.22	5.83	3.50	.136	.080	1.51
Stockbridge	None	25.00	24.20	1.50	10.05	9.50	0.55	1.58	.24	.14	.10	2.27	1.91	1.26	.037	.026	.47
Westborough	None	81.67	60.37	21.30	40.65	23.40	17.25	3.50	.67	.34	.33	11.72	10.82	6.21	.160	.078	1.67
Worcester (day) ⁴	Tanks	103.60	66.33	37.27	43.27	15.40	27.87	3.24	.70	.24	.46	12.27	16.80	5.36	3.667	.253	2.29

¹ Six samples.

² Four samples.

³ Ten samples.

⁴ Three samples (Jan., Feb., April).

TABLE No. 3. — *Efficiency of Settling Tanks and Other Forms of Preliminary Treatment as indicated by the Foregoing Tables.*
 [Parts in 100,000.]

CITY OR TOWN.	Form of Preliminary Treatment.	SUSPENDED SOLIDS.			TOTAL ALBUMINOID AMMONIA.			OXYGEN CONSUMED.			FATS. ¹			CHLORINE.	
		Raw Sewage.	Settled or Treated Sewage.	Per Cent removed.	Raw Sewage.	Settled or Treated Sewage.	Per Cent removed.	Raw Sewage.	Settled or Treated Sewage.	Per Cent removed.	Raw Sewage.	Settled or Treated Sewage.	Per Cent removed.	Raw Sewage.	Settled or Treated Sewage.
BROOKTON	Tanks	19.17	7.78	59	.79	.53	33	6.07	4.34	29	9.15	4.03	56	7.24	7.80
Clinton	Basins	97.15	8.93	91	1.84	.60	67	19.38	6.30	67	58.66	9.60	84	6.75	5.14
Easthampton	Tanks	23.45	17.15	27	.70	.71	—	5.80	5.65	3	—	—	—	5.70	5.60
Fitchburg	Imhoff	21.84	5.27	76	.51	.36	29	5.05	3.57	29	7.28	2.88	60	5.56	5.59
Framingham	Imhoff	17.60	7.13	59	.85	.53	38	6.51	4.46	31	7.06	3.97	44	9.09	7.38
Franklin	Tanks	11.20	2.47	78	.47	.28	40	5.06	2.01	60	—	—	—	4.26	5.12
GARDNER (Templeton Area)	Tanks	27.27	6.90	75	1.18	.44	63	7.74	3.74	52	8.44	7.27	14	7.81	6.88
Hopedale	Tanks	27.28	10.60	61	1.15	.49	57	8.78	4.07	54	—	—	—	8.96	6.02
Hudson	Tanks	36.52	9.18	75	1.42	.52	63	10.75	4.76	56	14.32	6.52	54	9.70	7.88
MARLBOROUGH	Tanks	37.55	13.11	65	1.30	.82	37	10.49	6.34	40	16.85	7.13	58	14.38	11.92
Milford	Tanks	28.52	10.38	64	.88	.45	49	8.20	4.05	51	—	—	—	9.26	7.67
Milford	Imhoff	28.52	8.40	71	.88	.50	43	8.20	4.48	45	—	—	—	9.26	6.96
North Attleborough	Tanks	3.90	2.28	41	.30	.28	7	2.39	2.11	12	—	—	—	3.87	4.88
Northbridge	Tanks	13.37	3.67	73	.74	.31	58	5.82	2.57	56	—	—	—	3.62	3.32
Norwood	Tank	28.09	23.37	17	.64	.75	—	10.17	7.77	24	10.15	8.91	12	17.16	16.10
Southbridge	Tanks	19.59	10.16	48	.78	.65	17	7.28	5.83	20	12.16	7.29	40	7.23	9.22
WORCESTER	Chemical Precipitation	34.80	7.47	79	.86	.28	67	16.80	5.33	68	—	—	—	9.07	9.86

¹ Fats determined in about 75 per cent of the samples.

TABLE No. 4. — *Average Results of the Analyses of Monthly Samples of Sewage applied to the Trickling Filters at Brockton, Fitchburg and Milford and of their Effluents, etc., Per Cent removed, etc.*
 [Parts in 100,000.]
Brockton.

	RESIDUE ON EVAPORATION.						AMMONIA.				Chlorine.	NITROGEN AS —		OXYGEN CONSUMED.		Kjeldahl Nitrogen.	Fats.	REMARKS.
	TOTAL RESIDUE.			LOSS ON IGNITION.			Free.	ALBUMINOID.				Nitrates.	Nitrites.	Unfiltered.	Filtered.			
	Total.	Dissolved.	Suspended.	Total.	Dissolved.	Suspended.												
Settled sewage as applied to trickling filter.	44.58	36.80	7.78	20.03	13.38	6.65	4.55	.53	.31	.22	7.80	—	—	4.34	2.61	1.27	4.03	Trickling filter has an area of 2.0 acres and a depth of 10 feet of stone from 1.5 to 3 inches in size.
Effluent from trickling filter.	47.07	40.28	6.79	19.45	14.22	5.23	2.32	.35	.16	.19	8.40	1.6589	.0278	3.43	1.78	.90	1.87	One-half of filter used alternately. The average rate of operation was about 2,382,000 gallons per acre per day.
Per cent removed	—	—	13	3	—	21	49	34	48	14	—	—	—	21	32	29	54	Period of sedimentation averaged about 1.8 hours.
Settled effluent from trickling filter.	45.20	39.52	5.68	17.60	13.90	3.70	2.66	.29	.15	.14	8.85	1.6253	.0291	2.89	1.78	.75	1.72	
Per cent removed by tank.	4	2	16	10	2	29	—	17	6	26	—	—	—	16	0	17	8	
Per cent removed by trickling filter and settling tank.	—	—	27	12	—	44	42	45	52	36	—	—	—	33	32	41	57	Tanks cleaned 50 times.

TABLE No. 4. — *Average Results of the Analyses of Monthly Samples of Sewage applied to the Trickling Filters at Brockton, Fitchburg and Milford and of their Effluents, etc., Per Cent removed, etc. — Concluded.*

[Parts in 100,000.]

Fitchburg.

	RESIDUE ON EVAPORATION.						AMMONIA.				NITROGEN AS —		OXYGEN CONSUMED.		Fats.	Kjeldahl Nitrogen.	REMARKS.	
	TOTAL RESIDUE.			LOSS ON IGNITION.			Free.	ALBUMINOID.			Nitrates.	Nitrites.	Unfiltered.	Filtered.				
	Total.	Dissolved.	Suspended.	Total.	Dissolved.	Suspended.												
Imhoff tank effluent as applied to trickling filter.	35.98	30.71	5.27	15.31	12.09	3.22	2.41	.36	.24	.12	5.59	—	—	3.57	2.79	.75	2.88	Trickling filter has an area of 2.14 acres and a depth of 10 feet of stone from 1 to 3 inches in size. The average rate of operation was about 1,860,000 gallons per day for area used (1.86 acres).
Effluent from trickling filter.	35.11	30.09	5.02	14.13	11.31	2.82	.53	.17	.08	.09	5.60	1.5298	.0089	1.91	1.29	.47	—	—
Per cent removed	2	2	5	8	6	12	78	53	67	25	—	—	—	46	54	37	—	—
Settled effluent from trickling filter as discharged to Nashua River.	32.69	28.48	4.21	13.15	11.01	2.14	.50	.15	.08	.07	5.58	1.4973	.0112	1.58	1.19	.43	—	—
Per cent removed by secondary settling tanks.	7	5	16	7	3	24	6	12	0	22	—	—	—	17	8	9	—	—
Per cent removed by trickling filter and secondary settling tanks.	9	7	20	14	9	34	80	58	67	42	—	—	—	56	57	43	—	—

Milford.

Imhoff tank effluent as applied to trickling filter.	49.29	40.89	8.40	22.93	16.29	6.64	4.44	.50	.26	.24	6.96		-	1.14	Trickling filter has an area of .28 acre and a depth of 6 feet of stone from 1 to 1½ inches in size.
Effluent from trickling filter as discharged to Charles River.	50.42	40.20	10.22	18.89	12.73	6.16	2.35	.41	.12	.29	6.47	1.0467	.1008	.90	
Per cent removed	-	2	-	18	22	7	47	18	54	-	-	21	51	21	

TABLE NO. 5. — *Average Results of Analyses of Monthly Samples of Effluent from Sand Filters.*

[Parts in 100,000.]

CITY OR TOWN.	Free Ammonia.	Total Albuminoid Ammonia.	Chlorine.	NITROGEN AS —		Iron.
				Nitrates.	Nitrites.	
Attleboro ¹	.88	.0527	5.13	1.0025	.0321	.035
Brockton ²	1.90	.0669	7.66	1.3707	.0256	.679
Clinton ²	2.20	.0816	4.92	.1020	.0014	1.550
Concord ¹	.16	.0586	4.42	1.3738	.0312	.040
Easthampton ¹	.04	.0247	4.35	1.6220	.0040	.040
Framingham ² (Imhoff)	1.72	.0800	8.18	1.8791	.0175	.464
Framingham (direct)	3.27	.1286	8.29	.4018	.0126	1.042
Franklin	1.86	.1148	16.03	.8335	.0086	.389
Gardner (Gardner Area) ³	2.39	.2030	9.68	.6162	.0298	.489
Gardner (Templeton Area) ²	4.07	.1711	8.46	.8446	.0225	.646
Hopedale ²	1.68	.0710	5.84	2.2758	.0041	.026
Hudson	1.17	.0786	7.55	1.7118	.0285	.147
Leicester ³	.67	.0480	3.70	2.4005	.0260	.104
Marion ¹	1.51	.0597	5.90	.2342	.0166	.528
Marlborough ²	.87	.0599	8.73	2.1189	.0208	.089
Milford ⁴	2.07	.0828	7.55	.7630	.0642	.308
Natick	4.79	.0527	10.71	.0413	.0001	.844
North Attleborough ¹	.27	.0294	4.00	.5600	.0102	.055
Northbridge ¹	.35	.0355	3.53	.7408	.0134	.136
Norwood ²	1.43	.0664	13.71	.2602	.0190	.637
Pittsfield ²	.69	.0486	5.15	.6817	.0295	.513
Southbridge ²	4.14	.0772	8.46	.0334	.0000	1.170
Stockbridge ²	.38	.0728	2.36	.5357	.0824	.057
Westborough ²	2.17	.0964	7.78	.0802	.0144	1.066
Worcester ⁵	2.97	.0890	11.23	.2333	.0313	1.590

¹ Six samples.² Regular samples from two or more underdrains in one average.³ Four samples.⁴ Ten samples.⁵ Three samples.TABLE NO. 6. — *Efficiency of Sand Filters (Per Cent of Free and Albuminoid Ammonia removed).*

[Parts in 100,000.]

CITY OR TOWN.	FREE AMMONIA.			TOTAL ALBUMINOID AMMONIA.			CHLORINE.		Rate of Operation with Even Distribution (Gallons per Acre per Day) ¹
	Applied Sewage.	Effluent.	Per Cent removed.	Applied Sewage.	Effluent.	Per Cent removed.	Applied Sewage.	Effluent.	
Attleboro	3.91	.88	77	.70	.0527	92	5.00	5.13	51,000
Brockton	4.55	1.90	58	.53	.0669	87	7.80	7.66	-
Clinton	3.15	2.20	30	.60	.0816	86	5.14	4.92	54,000
Concord	3.21	.16	95	1.01	.0586	94	5.57	4.42	86,000
Easthampton	5.79	.04	99	.71	.0247	97	5.60	4.35	-
Framingham (Imhoff)	4.26	1.72	60	.53	.0800	85	7.38	8.18	44,000
Framingham (Direct)	4.03	3.27	19	1.34	.1286	90	10.34	8.29	
Franklin	2.67	1.86	30	.28	.1148	59	5.12	16.03	58,000
Gardner (Gardner Area)	7.80	2.39	69	1.25	.2030	84	9.70	9.68	-
Gardner (Templeton Area)	3.98	4.07	-	.44	.1711	61	6.88	8.46	-
Hopedale	4.88	1.68	65	.49	.0710	86	6.02	5.84	43,000
Hudson	5.05	1.17	77	.52	.0786	85	7.88	7.55	45,000
Leicester	1.80	.67	63	.46	.0480	90	3.08	3.70	-
Marion	2.33	1.51	35	.31	.0597	81	4.83	5.90	112,000
Marlborough	6.90	.87	87	.82	.0599	93	11.92	8.73	44,000
Milford	4.72	2.07	56	.45	.0828	82	7.67	7.55	31,000
Natick	4.03	4.79	-	.54	.0527	90	11.62	10.71	47,000
North Attleborough	1.92	.27	86	.28	.0294	90	4.68	4.00	89,000
Northbridge	2.34	.35	85	.31	.0355	89	3.32	3.53	60,000
Norwood	3.76	1.43	62	.75	.0664	91	16.10	13.71	91,000
Pittsfield	2.46	.69	72	.39	.0486	88	5.91	5.15	100,000
Southbridge	5.54	4.14	25	.65	.0772	88	9.22	8.46	109,000
Stockbridge	1.58	.38	76	.24	.0728	70	2.27	2.36	-
Westborough	3.50	2.17	38	.67	.0964	86	11.72	7.78	60,000
Worcester	3.24	2.97	8	.70	.0890	87	12.27	11.23	55,000

¹ See also Table No. 7.

TABLE NO. 7. — *Extent of Sewerage Works, Rate of Flow, and Rate of Operation of Sand Filters.*

CITY OR TOWN.	Popu- lation, Census of 1925.	Approxi- mate Length of Sanitary Sewers (Miles).	Approxi- mate Number of House Con- nections.	ESTIMATED QUANTITY OF SEWAGE TREATED (GALLONS PER DAY).			Estimated Average Quantity of Sewage per Connection.	Net Area of Filter Beds.	Estimated Rate of Operation with Even Dis- tribution (Gallons per Acre per Day).
				Average for Year.	Average for Month of Maximum Flow.	Average for Month of Minimum Flow.			
ATTLEBORO	20,623	35.03	1,435	797,000	965,000	565,000	555	15.50	51,000
BROCKTON	65,343	95.75	8,624	2,716,000 ¹	3,627,000	1,980,000	315	37.00	—
Clinton	14,180	23.83	1,787	1,414,000 ²	1,545,000	1,414,000	792	26.23	54,000
Concord	7,066	8.05	495	367,000	481,000	303,000	742	4.28	86,000
Easthampton	11,587	20.75	1,120	—	—	—	—	2.20	—
FITCHBURG	43,609	—	—	3,453,000	3,844,000 ³	2,531,000 ⁴	—	—	—
Framingham	21,078	37.50	2,848	1,284,000	352,000	90,000	451	29.12	44,000
Franklin	7,055	14.20	745	187,000	—	—	251	3.24	58,000
GARDNER	18,730	32.78	2,196	—	—	—	—	12.50	—
Hopedale	3,165	6.15	352	163,000	232,000	135,000	463	3.79	43,000
Hudson	8,130	12.66	939	401,000	532,000	303,000	427	9.00	45,000
Marion	1,271	3.93	183	84,000	117,000	50,000	459	0.75	112,000
MARLBOROUGH	16,236	34.75	2,435	917,000	1,366,000	585,000	377	20.90	44,000
Milford	14,781	19.00	1,480	286,000 ⁵	601,000	210,000	—	9.30	31,000
Natick	12,871	12.00	1,470	592,000	938,000	420,000	403	12.60	47,000
North Attleborough	9,790	17.23	738	621,000	703,000	526,000	842	7.00	89,000
Northbridge	10,051	15.34	848	723,000	799,000	680,000	853	12.00	60,000
Norwood	14,151	22.64	1,640	1,229,000	1,425,000	—	749	13.54	91,000
Pittsfield	46,877	67.66	5,712	4,108,000 ²	4,327,000	4,144,000	719	41.15	100,000
Southbridge	15,489	20.00	1,279	924,000	1,016,000	—	722	8.50	109,000
Westborough	6,348	7.90	581	346,000	506,000	268,000	596	5.80	60,000
WORCESTER	182,242	196.83 ⁶	—	3,570,000 ⁷	—	—	—	64.50	55,000

¹ Includes an average of 2,382,000 gallons per day to trickling filter and 334,000 gallons to sand filter.² Entire quantity of sewage not treated.³ Maximum day.⁴ Minimum day.⁵ Records questionable. Amount treated by sand filters only.⁶ Includes 70.01 miles of combined sewers.⁷ Amount treated by sand filters Jan. to June inclusive. Total flow 21,410,000 gallons per day.

TABLE No. 8. — *General Features.*

CITY OR TOWN.	Year of Construction of and Additions to Works.	Depth of Under-drains (Feet).	Distance Apart of Under-drains (Feet).	Filtering Material.	Attention given to Disposal Works.
ATTLEBORO	1912, 1913	4-7	35	Excellent sand and gravel; found in place	One man all the time; others when necessary.
BROCKTON	1893, 1905, 1908, 1912	5-5	30	Good sand and gravel; found in place; trickling filter.	Two men all the time; others when necessary.
Clinton	1898, 1899	8	60-70	Good sand and gravel; found in place	One man once a day.
Concord	1889	none	-	Good sand underlaid with gravel; found in place	One man all the time; others when necessary.
Fitchburg	1908	3-5	20-40	Good sand and gravel; largely found in place	Chemist in charge; one foreman, 1 day and 2 night men.
FITCHBURG	1914	-	-	Trickling filter — 10 feet deep	Very little attention; one man once in a while.
Framingham	1890, 1924	-	-	Good sand and gravel	One man all the time; others when necessary.
Franklin	1915	4-5	26	Good sand; handled in construction	One man all the time; others when necessary.
GARDNER (Gardner Area)	1891	5.	20	Coarse sand; handled in construction	One man all the time; others when necessary.
GARDNER (Templeton Area)	1901, 1909	3-4	20-30	Good material — sand and gravel	One man all the time; others when necessary.
Hopedale	1900, 1923	3	35-60	Good sand and gravel; found in place	One man all the time; others when necessary.
Hudson	1904, 1910	5-6	50-100	Hard, compact sand; found in place	Very little attention.
Leicester	1894	4	8	Mostly good sand; pockets of fine sand and some ledge, largely found in place	One man every day in summer; every other day in winter.
Marion	1906	5	-	Rather fine sand; found in place	One man all the time; others when necessary.
MALBOROUGH	1801, 1908, 1909, 1910, 1911	4-5-6	30-50	Rather fine sand; found in place. Trickling filter	One man every day; others when necessary.
MILFORD	1896	5	40	Sand of good quality, but stratified; found in place	One man all the time; others when necessary.
Natick	1909, 1910	5-6-5	55	Coarse sand and gravel; found in place	One man every day; others when necessary.
North Attleborough	1906, 1907, 1920	4	50-75	Coarse sand and gravel; mostly handled	Two men all the time; others when necessary.
Northbridge	1909, 1918,	4-6	40	Good sand and gravel; partly handled	One man all the time; others when necessary.
Norwood	1923, 1924	-	-	Good sand; mostly found in place	Two men all the time; others when necessary.
PITTSFIELD	1901, 1915	4	35	Fair sand and gravel; considerable quantity handled, some found in place.	One man part of every day.
Southbridge	1908	4	40	Good sand and gravel; largely found in place	One man all the time; others when necessary.
Spencer	1897, 1923	-1	-	Sand filters, good quality sand	One man all the time.
Stockbridge	1899, 1921, 1922	3-4-5	23	Irrigation area, rather fine sand	One man all the time; others when necessary.
Westborough	1892, 1911	5	30	Good sand and gravel; handled in construction	Several men all the time; large force spring and fall.
WORCESTER	1898 ²	4-6	35-50	Good sand and gravel; largely found in place	

¹ Only three beds underdrained.² Year of first construction of sand filters. Many additions.

EXAMINATION OF SEWER OUTLETS DISCHARGING INTO THE SEA.

Examinations have been made of practically all of the important sewer outlets discharging into the sea during the past year largely in connection with the shellfish investigation under Chapter 300 of the Acts of 1925. Special investigations were made of the New Bedford sewer outlet. Contracts have been let for the construction of a new outfall sewer for the city of Lynn and work is also under way for the extension and improvement of the main sewer outlet for the cities of Salem, Beverly and Peabody, the town of Danvers and certain public institutions in Danvers and Middleton.

SEWERAGE AND SEWAGE DISPOSAL FOR THE CITIES OF SALEM, BEVERLY AND PEABODY AND THE TOWN OF DANVERS AND FOR CERTAIN PUBLIC INSTITUTIONS.

Early in the year the special commission appointed under the provisions of Chapter 67 of the Resolves of the year 1924 for further consideration and recommendation as to the apportionment of the cost of certain proposed sewerage works presented its report to the Legislature with a draft of an act providing for the creation of a district to be known as the South Essex Sewerage District which should include the cities, town and institutions referred to in the resolve.

Following the presentation of this report, the Legislature passed an act, Chapter 339 of the Acts of the year 1925, following substantially the recommendations of the special commission. This act establishes the South Essex Sewerage District under a board to be known as the South Essex Sewerage Board and authorizes the board to borrow \$1,500,000 for the construction of a general system of sewerage in accordance with the general plan for such a system presented to the Legislature by this Department in 1924 and printed as House Document No. 1175.

SEWAGE DISPOSAL OF THE CITY OF LYNN.

Plans for the construction of works for the disposal of the sewage of the city of Lynn through an outlet into the sea were completed during the year and approved by this Department. Contracts have been let for the construction of the works under these plans.

SEWAGE DISPOSAL OF THE CITY OF GLOUCESTER.

Under the provisions of Chapter 13 of the Resolves of 1924, the Department, acting jointly with the Board of Sewerage Survey of the City of Gloucester, made its investigation for a general system of sewerage for that city and presented its report to the Legislature of 1925 which was printed as Senate Document No. 122. The Board recommended the discharge of sewage into the outer harbor in deep water.

WATER SUPPLY OF LAWRENCE AND METHUEN.

Under the provisions of Chapter 61 of the Resolves of 1924, the Department, acting jointly with the Commission on New Water Supply of the city of Lawrence and the Board of Water Commissioners of the town of Methuen, began an investigation relative to the water supply of Lawrence and Methuen but, finding it necessary to consider the water supply needs of the city of Lowell, recommendation was made to the Legislature that Lowell be afforded an opportunity to join the investigation. The Legislature subsequently, by the provisions of Chapter 28 of the Resolves of the year 1925, amended Chapter 61 of the Resolves of 1924 to authorize the city of Lowell to join the investigation. Subsequently the City Council of Lowell voted not to join the investigation and the work was accordingly limited to consideration of the water supply of Lawrence and Methuen, and a report will be presented to the Legislature early in 1926.

SHELLFISH INVESTIGATION.

The investigation of the condition of the shellfish in the tidal waters and flats of the State required of the Department under Chapter 300 of the Acts of 1925 has been carried out and a special report thereon will be submitted to the Legislature. Under this investigation the whole of the coast line of the State, amounting to some 2,000 miles, has been covered and the Department has determined that some 20 areas are contaminated while some six extensive areas have been found uncontaminated.

SANITARY CONDITION OF THE ABERJONA RIVER.

The provisions of Chapter 16 of the Resolves of 1925 called for a further investigation by this Department of the sanitary condition of the Aberjona River and its tributaries and legislation pertaining thereto, and a report thereon, together with certain recommendations, will be filed as required by the resolve.

IMPROVEMENT OF SPY POND IN THE TOWN OF ARLINGTON.

Under the provisions of Chapter 19 of the Resolves of 1925 an investigation has been made during the year relative to the improvement of Spy Pond in the town of Arlington and a report thereon will be presented to the Legislature as required by that resolve.

DISPOSAL OF GARBAGE AND REFUSE.

The Legislature of 1925, under the provisions of Chapter 23 of the Resolves of that year, directed the Department to study and examine into the matter of the disposal of garbage, waste and other refuse and make such recommendations relative thereto as it might deem advisable under the existing circumstances. A report on the results of this investigation will be presented to the Legislature as required by that resolve.

CONDITION OF STONY BROOK, BOSTON.

Under the provisions of Chapter 33 of the Resolves of 1925 the Department was directed to designate one of its engineers to act as a member of a special commission to investigate the necessity of constructing a covered channel to accommodate the waters of the Canterbury Branch of Stony Brook in the city of Boston. The report of the special commission will be presented to the Legislature in a separate document.

WATER SUPPLY OF STATE SANATORIA.

Under the provisions of Chapter 277 of the Acts of the year 1925 the Lakeville State Sanatorium was authorized to acquire an additional water supply. Investigations were made during the year to determine the practicability of obtaining a water supply for that institution in the neighborhood of Clear Pond, authorized in the act.

The results of the investigation showed that the ground water about the pond is impregnated with iron to such an extent that it would probably be unsatisfactory to use it directly for the supply of the institution, but it was also found that an adequate supply of good water could probably be obtained from Clear Pond supplemented, if need be, by the ground water in its neighborhood.

This Division also supervised the installation of additional wells to supplement the water supply of the Westfield State Sanatorium and the relocation of a water main affording connection with the water supply of the city of Westfield.

NEPONSET RIVER IMPROVEMENT.

The commission appointed by the Supreme Judicial Court in 1921 to determine what proportion of one-half of the expense incurred in the improvement of the Neponset River, carried out under the provisions of Chapter 655 of the Acts of the year 1911, shall be paid by certain municipalities in the valley mentioned in the act, completed its work and made its report to the Supreme Judicial Court in the latter part of the year.

NUISANCES FROM NOISOME TRADES.

Considerable work has been done during the year in connection with the investigation of certain large piggeries, particularly those at Wayland near the Lincoln line and in North Woburn. In the former case the petition has been dismissed with a recommendation that the piggery be continued under capable management and the supervision from time to time of engineers of experience in such matters. In the latter case the Department held a hearing at the State House on June 16, 1925, and found that the piggery as extended was a detriment to the health, comfort and convenience of the occupants of a neighboring dwelling. The Department required certain changes which were subsequently carried out.

Many investigations have been made of offensive odors in the vicinity of the large industrial center in Everett, several petitions and communications having been received regarding this matter during the year. The matter was under investigation at the close of the year.

REPORT OF DIVISION OF WATER AND SEWAGE LABORATORIES.

H. W. CLARK, *Director.*

During 1925 this Division accomplished rather more than its usual volume of analytical work and carried on much research concerning water purification, sewage and sewage disposal, the treatment of trades wastes and other sanitary problems. In pursuance of this work the number of samples shown in the following table were analyzed chemically, bacterially and microscopically. The results of all the chemical analyses of public water supplies, rivers, sewage applied to and effluents from municipal sewage disposal areas, etc., are summarized in tables presented in a report of the Division of Sanitary Engineering.

A large amount of field work was done during the year in connection with the examination of water supplies, rivers, sewage disposal areas, shellfish areas, etc., and special investigations were carried on concerning two important subjects, namely, (1) the quality of shellfish coming from the shellfish areas of the State and the pollution or non-pollution of these areas by sewage, industrial wastes, etc., and (2) a very thorough study of the iodine content of the public water supplies of the State, this latter study being made in connection with an investigation of the Department in regard to the prevalence or non-prevalence of goiter in Massachusetts. The examination of the shellfish areas and the research work in regard to the bacteriology of shellfish necessitated the examination of 1,540 samples of shellfish and 1,183 samples of sea water and sewage. In connection with this investigation much laboratory work was done to study the changes taking place in the bacterial content of the various kinds of shellfish during shucking, when kept in markets and during transportation.

The iodine investigation called for one hundred and nine determinations of this element in the water supplies of eighty-six cities and towns.

One of the subjects of great interest to those dealing with water supplies is the effect of water upon metal pipes of different kinds, that is, corrosion of pipes, certain metals being affected by some waters and not by others. Work upon corrosion has had to be carried on by this Division for the past twenty-eight or thirty years and several special articles have been published by us in regard to the corrosion of metal pipes of different kinds, the occurrence of lead poisoning from lead service pipes, etc. During the past year or two the use of copper service pipes has been strongly advocated and many are beginning to be used, and while we have made many investigations in regard to the effect of different waters on brass pipe (an alloy of copper and zinc) few, if any, have been made on copper alone; hence during the past year we have had in operation four sets of copper pipes through which has been passed water from two varying surface waters and two varying ground water supplies. While a number of analyses have been made to determine the amount of copper taken into solution by these waters, both when held in the pipe for periods of a number of hours and when passing through the pipe more or less rapidly as during household use, not enough data have been gathered to present as fully as desired. It has been proved, however, that the waters so far tested have little power of taking copper into solution.

At the Experiment Station many filters and tanks were operated in order that the Department might have adequate and up-to-date information in regard to all methods of water and sewage treatment and purification and in order to intelligently answer the many applications made to the Department for advice in regard to such matters.

As usual the Station and the laboratories of this Division were visited during the year by many chemists, engineers and others desiring information, and several classes of students from colleges and public health schools were instructed by the laboratory force.

A table showing the amount and general character of all the analytical work carried on by this Division during the year is presented here.

State House Laboratories.

Samples from public water supplies:	
Surface waters	2,499
Ground waters	1,226
Samples from domestic wells, ice supplies, etc.	602
Samples from rivers	1,067
Samples from sewage disposal works:	
Sewages	450
Effluents	607
Samples of wastes and effluents from factories	98
Samples of sea waters	22
Miscellaneous samples (partial analyses)	43
Microscopical examinations	2,315
Special examinations of water (including field work) for manganese, lead, alkalinity and acidity, dissolved oxygen, carbonic acid, copper, oil, etc.	1,299

Lawrence Experiment Station.

Chemical examinations on account of investigation concerning the disposal of domestic sewage and factory wastes, filtration and other treatment of water supplies, swimming pools, and the investigation of the Merrimack River	1,675
Mechanical and chemical examinations of sands	194
Iodine determinations of public water supplies	125
Bacterial examinations of water supplies, rivers, sewage filter effluents, ice, swimming pools, etc.	2,098
Bacterial examinations in connection with methods of purification of sewage and water	1,245
Bacterial examinations of shellfish and sea waters	2,703

IODINE IN MASSACHUSETTS WATER SUPPLIES.

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During recent years much interest has been aroused throughout the country concerning the great prevalence of goiter in certain regions and its relation to iodine in water and food. Investigations were made that seemed to show that in those parts of the country where there is an iodine deficiency in the public water supplies goiter is exceedingly prevalent and for many years a similar belief has been held by the people of England and the continent of Europe.

More or less thorough studies have been made of the question of iodine and water supplies in Michigan, Minnesota, Ohio and a few other states and the Bureau of Fisheries of the United States Department of Commerce has made quite thorough investigations in regard to the iodine content of sea foods and of many cereals, grains, etc.

It has of course been well known for many years that we are not dependent upon water for iodine as it is found in considerable amounts in certain vegetables and grains and in large amounts in salt water fish. All of this knowledge and information has been brought out very clearly by the Government studies just referred to. The studies of this Division have shown, speaking generally, that Massachusetts waters are comparatively high in iodine and our goiter rate should of course be comparatively low. A few of our waters, however, are entirely deficient in this necessary element and a number contain it only in very minute amounts.

We have found that there is not only a great difference in the iodine content of Massachusetts waters but often a great difference in the supplies of adjoining towns. It has also been noted by us that the amount of iodine, especially in surface waters, differs with the seasons of the year, being less in winter and spring when rains and melting snows are filling ponds and reservoirs and greater in summer when these supplies are low. It is of course evident that the geological formation has a great bearing upon the results obtained and that iodine is obtained by water from certain soils and rocks while other soils and rocks yield little or none. Owing to the minute quantity present in most waters the amount found is expressed in parts per billion and in order to detect it in such waters as we have examined, it has been necessary to evaporate at least thirty gallons of each sample. The following tables give the iodine results obtained during the year. In general, as will be noted, the iodine content of water in the eastern part of the State is greater than

in the western but certain results seem to show that the amount found is not closely related to proximity to or distance from the ocean.

It was noticed by us while making the iodine analyses that some of our waters contain much more silica than others, and as silica is rarely determined in waters it was decided that owing to the volume evaporated for the iodine determination and the method used, this was a good opportunity to make such analyses, hence many silica results are also given in the tables:—

Iodine and Silica in Surface Waters.

SUPPLY.	1925.	Iodine (Parts per Billion).	Silica (Parts per 100,000).
Adams	Nov. 24	.00	.40
Amherst	July 1	.01	.85
Amherst	Sept. 9	.57	.85
Andover	Jan. 7	.31	—
Athol	May 19	3.27	—
Barre	July 3	.60	.58
Blandford	Aug. 1	.42	.71
Blandford	Oct. 3	.09	.95
Brookton	June 17	3.60	.72
Cambridge	Oct. 27	1.71	.53
Cheshire	July 15	.04	.41
Cheshire	Sept. 16	.57	.49
Chester	July 20	.54	.43
Chicopee	July 27	.22	1.01
Chicopee	Sept. 28	.10	1.05
Colrain	July 10	.19	.56
Colrain	Sept. 12	.47	.47
Concord	Aug. 6	1.37	.29
Danvers	April 16	3.99	—
Fall River	June 18	3.13	.31
Falmouth	Aug. 18	1.75	.37
Fitchburg, Wyman Res.	May 4	2.84	—
Framingham (Met. Water Supply)	June 2	5.98	—
Gardner	May 21	.58	—
Gloucester, Wallace Res.	April 18	5.20	—
Great Barrington	Nov. 3	.10	.56
Greenfield	May 13	1.67	—
Hatfield	July 25	.18	.80
Hatfield	Sept. 14	.33	1.15
Haverhill, Kenoza Lake	Mar. 9	3.79	—
Haverhill, Johnson's Pond	April 2	1.63	—
Hinsdale	July 15	.80	.51
Holyoke, Ashley Ponds, Whiting Res.	June 25	5.86	.27
Ipswich	March 4	.81	—
Ipswich	July 1	3.93	.32
Ipswich River at Lynn Intake	April 23	1.41	—
Lawrence	Jan. 1	.14	—
Lawrence	Mar. 4	.22	—
Lawrence	Oct. 25	1.33	.70
Lawrence	Nov. 19	.50	.90
Lawrence, Merrimack River	Nov. 19	.37	.58
Lee	Nov. 9	1.66	.40
Lenox	Oct. 26	.60	.82
Lynn	April 29	6.33	—
Marlborough	Aug. 12	2.35	.35
Metropolitan at Spot Pond	April 10	4.33	—
Metropolitan at State House	April 25	2.38	—
New Bedford	June 17	4.09	.64
No. Adams	May 16	1.00	—
Northampton	June 26	2.06	1.26
No. Andover	Jan. 1	.10	—
No. Andover	April 17	.20	—
No. Andover	Aug. 4	1.28	—
Norwood	Nov. 24	.22	.91
Peabody	May 6	2.92	—
Pittsfield	May 22	1.49	—
Plymouth	June 24	3.69	.30
Rockport	April 1	4.40	—
Rutland	July 30	.90	.10
Salem-Beverly	June 11	2.54	—
Sharon	June 9	2.54	.12
Shelburne Falls	Nov. 28	.95	.60
Southbridge	May 27	3.50	—
Spencer	July 24	2.98	.22
Springfield	May 15	.91	—
Stockbridge	May 27	.82	—
Stockbridge	Oct. 28	2.18	.65
Taunton	June 15	3.19	1.18
Wakefield	April 17	2.90	—
Warren	April 21	.24	—
Warren	Sept. 16	.33	1.05
Westfield	July 29	.73	.63
Williamstown	June 1	.28	—
Williamstown	Sept. 23	.11	—
Worcester	June 9	1.96	—

Iodine and Silica in Ground Waters.

SUPPLY.	1925.	Iodine (Parts per Billion).	Silica (Parts per 100,000).
Amesbury	Mar. 16	3.13	—
Ayer	May 4	.45	—
Ayer	Sept. 24	5.20	1.13
Barnstable	June 25	4.11	1.21
Billerica	Aug. 19	1.96	1.36
Brookline	Aug. 28	.40	1.77
Dedham	Sept. 2	.19	.62
Dedham	Oct. 8	1.39	.96
Duxbury	Aug. 20	.00	.91
Duxbury	Oct. 7	.00	1.11
Franklin	July 30	.05	1.12
Franklin	Sept. 24	.14	1.16
Hingham	Aug. 19	1.33	.63
Hopkinton	Aug. 6	.00	1.39
Kingston	Aug. 20	3.56	1.63
Leicester	Aug. 3	.50	1.03
Lowell	April 3	1.02	—
Mansfield	Sept. 22	.09	.75
Methuen	Mar. 23	2.58	—
Middleborough	Sept. 9	.90	1.17
Newburyport ¹	April 9	4.03	—
Palmer	June 26	3.97	.49
Provincetown	Aug. 18	.00	1.39
Reading	April 24	1.80	—
Salisbury	April 27	3.51	—
Uxbridge, high service	Aug. 17	.18	.95
Waltham	Aug. 10	3.84	.72
Wareham	Aug. 29	.16	.70
Wellesley	Aug. 29	.09	1.12
Wellesley	Oct. 10	.10	1.05
Westborough	Aug. 13	3.23	.45
West Brookfield	July 8	3.06	.30
Westford	May 20	.10	1.00
Weston	Sept. 4	.20	1.60
Winchendon	July 6	.61	1.12

¹ Mixture of ground and surface water.

EXAMINATION OF SHELLFISH.

During 1925 the Department made an extended investigation in regard to the character of clams, oysters, quahaugs, etc., from all the shellfish areas of the State and investigated the pollution of the areas by sewage and other wastes. This Division did as usual all the laboratory work necessary in carrying out this investigation and also a small amount of field work. Much research work was accomplished also to show the bacteriology of shellfish, the changes occurring by shucking when held in markets, etc. In carrying out this work approximately 2,703 samples of shellfish and sea water were examined. The results of this work are given quite fully in a special report to the legislature (House No. 1150) but a few of the results and conclusions reached are included here.

The determination of the so-called coli score of the shellfish examined was made according to the standard methods of the American Public Health Association, little attention being paid (owing to the large amount of work necessary) to the determination of bacteria grown in four days at 20°C. or the twenty-four hour counts. In experimental work, however, carried on at the same time, these determinations were made as well as the coli score and also determinations of the amount of free ammonia found in the shellfish fresh from the areas and after shucking, storage in markets, etc.

Summarizing the laboratory work certain more or less important conclusions were reached as follows:—The coli score is of great value in determining the condition of shellfish in the shell brought to the laboratory in a cool, moist condition directly from the areas where taken and examined within twenty-four hours of collection. The determination of the coli score is also of great value in determining the quality or freedom from pollution of shucked clams or opened oysters when made within a certain definite period. It was found, however, that other factors may so obscure the coli score in other samples examined that it may become practically valueless. For example, in shucked clams, shucked under insanitary conditions other bacteria may and often do in a few days overgrow and destroy coli to such an extent that the score may be low in spite of this filthy and insanitary handling or collection from polluted sources. This we proved by

many laboratory experiments. It was also evident from our work that when shellfish are kept under the best conditions either in markets or during transportation the coli score almost universally decreases instead of increasing and hence laboratory examinations made after a few days might mislead the laboratory worker as to the condition of the shellfish if the coli score alone was depended upon; that is to say, clams shucked or unshucked having a high coli score at the coast might after several days' transportation or market storage be comparatively low in this respect. Only by the determinations of the bacteria grown at 20°C. and the 37°C. bacteria could correct conclusions as to the quality of these shellfish be drawn. Our investigations also seemed to prove that badly polluted shellfish both in the shell and shucked might after several days' storage have a lower coli score than clean shellfish held for the same period of time, this being due to the much greater growth of other bacteria in the polluted than in the non-polluted shellfish. Certain free ammonia determinations seemed to indicate that the age of shellfish and their condition as to staleness or freshness might perhaps be determined by this test.

Following tables show the amount of the work done and some of the experimental work to illustrate some of the statements made above:—

Number of Samples examined in Connection with Shellfish Control during 1925.

SAMPLE.	Total Number of Samples.	Number of Samples with B. Coli Scores of 50 or Less.
In shell:		
Soft clams	730	543
Quahaugs	268	238
Oysters	76	59
Mussels	17	16
Miscellaneous	6	5
Mixed	24	19
Shucked:		
Clams	266	62
Oysters	31	8
Experiments	102	—
Total shellfish	1,520	950
Sea waters	1,158	
Sewages	25	
Total samples to November 30	2,703	

Samples of shell stock were received from sixty-two cities and towns, and samples of shucked stock from twenty-seven cities and towns.

Tables presenting a Few of the Results of Experiments in Regard to the Effect of Time on Bacteria and Ammonia.

Clams in Shell from Market No. 1.

[Kept at about 38° F.]

PLANTED.	B. Coli Score.	BACTERIA PER CUBIC CENTIMETER.	FREE AMMONIA.
		4 Days 20° C.	Parts in 100,000.
On arrival at laboratory	14	260,000	1.40
After 1 day in ice box	32	330,000	2.20
After 2 days in ice box	14	330,000	1.20
After 4 days in ice box	14	400,000	3.70
After 8 days in ice box	23	55,000	21.20

Shucked Clams from Market No. 1.

[Kept at about 38° F.]

On arrival at laboratory	10,000	460,000	2.56
After 1 day in ice box	4,600	1,800,000	3.80
After 2 days in ice box	4,600	11,800,000	3.10
After 4 days in ice box	1,000	19,000,000	13.20

Clams in Shell from Market No. 2.

[Kept at about 38° F.]

On arrival at laboratory	1,400	135,000	2.50
After 1 day in ice box	2,300	550,000	1.90
After 2 days in ice box	140	780,000	1.50
After 4 days in ice box	230	440,000	2.10
After 8 days in ice box	32	940,000	8.00

Tables presenting a Few of the Results of Experiments in Regard to the Effect of Time on Bacteria and Ammonia — Concluded.

Shucked Clams from Market No. 2.

[Kept at about 38° F.]

PLANTED.	B. Coli Score.	BACTERIA PER CUBIC CENTIMETER.	FREE AMMONIA.
		4 Days 20° C.	Parts in 100,000.
On arrival at laboratory	8,200	370,000	2.96
After 1 day in ice box	10,000	1,500,000	2.70
After 2 days in ice box	1,000	9,000,000	4.50
After 4 days in ice box	460	4,500,000	5.30

Shucked Clams from Market No. 3.

[Kept at about 38° F.]

On arrival at laboratory	280,000	1,000,000	4.40
After 1 day in ice box	46,000	3,300,000	2.72
After 2 days in ice box	64,000	4,000,000	9.20
After 3 days in ice box	8,200	700,000	11.20

Shucked Clams from Market No. 3.

[Kept in Room, — temperature 50–70° F.]

On arrival at laboratory	280,000	1,000,000	4.40
After 1 day in ice box	28,000	5,200,000	9.20
After 2 days in ice box	64,000	38,000,000	23.20

Shucked Clams from Market No. 3.

[Kept at about 38° F.]

On arrival at laboratory	460	220,000	2.64
After 1 day in ice box	2,800	890,000	3.00
After 2 days in ice box	640	1,430,000	2.50
After 4 days in ice box	280	10,400,000	8.00

Clams collected by Laboratory Force.

[Kept at about 38° F.]

On arrival at laboratory	14	3,000	0.90
After 1 day in ice box	5	3,000	0.46
After 2 days in ice box	2	10,000	0.64
After 4 days in ice box	5	28,000	0.76
After 7 days in ice box	2	1,900	1.40

Clams collected by Laboratory Force from Plum Island River, Ipswich.

[Kept at about 38° F.]

On arrival at laboratory	0	1,400	0.80
After 1 day in ice box	0	3,000	0.32
After 2 days in ice box	5	20,000	0.52
After 4 days in ice box	5	13,000	0.73
After 7 days in ice box	2	15,000	0.88

Clams collected by Laboratory Force from Plum Island River, Ipswich.

[Kept at about 38° F.]

On arrival at laboratory	0	60,000	1.20
After 1 day in ice box	5	50,000	0.92
After 2 days in ice box	0	70,000	1.68
After 4 days in ice box	5	60,000	2.20

Opened Oysters from Market No. 3.

[Kept at about 38° F.]

On arrival at laboratory	1,000	60,000	1.20
After 1 day in ice box	460	240,000	1.76
After 2 days in ice box	640	310,000	2.16
After 3 days in ice box	280	1,300,000	1.82

Opened Oysters from Market No. 3.

[Kept in Room, — Temperature 50–70° F.]

On arrival at laboratory	1,000	60,000	1.20
After 1 day in ice box	1,000	1,800,000	2.40
After 2 days in ice box	820	21,000,000	0.56
After 3 days in ice box	460	4,000,000	3.60

Opened Oysters from Market No. 1.

[Kept at about 38° F.]

On arrival at laboratory	10,000	147,000	1.08
After 1 day in ice box	4,600	1,300,000	3.00
After 2 days in ice box	460	770,000	1.92
After 3 days in ice box	100	4,300,000	1.16

Opened Oysters from Market No. 1.

[Kept in Room, — Temperature 50–70° F.]

On arrival at laboratory	10,000	147,000	1.08
After 1 day in ice box	4,600	8,000,000	2.56
After 2 days in ice box	640	8,000,000	0.20
After 3 days in ice box	280	5,500,000	2.04

WATER PURIFICATION.

During the year 1925 sixteen sand filters of different kinds were operated at the Station to experiment upon and to illustrate different methods of water purification. Slow sand filtration, rapid sand filtration with the use of coagulants and sand filtration through filters impregnated with either ferric or aluminum hydroxide were studied. These filters loaded or impregnated with hydroxides have been described and their results given in the reports of the Station since 1917 and as such filters promise, and in fact illustrate, a method of economically decolorizing highly colored waters they are worth much attention and study. The hydroxides precipitated in the sand remove of course much organic matter other than coloring matter and hence the effluents from these filters are clear, low in color, brilliant and attractive. The filters are loaded by mixing throughout the sand when the filter is constructed the amount of finely divided magnesium oxide necessary to precipitate the desired amount of ferric or aluminum hydroxide from solutions of these bodies passed through the filter. Experience has shown that ferric hydroxide is the better substance to use as it is absolutely insoluble in the sodium hydroxide necessary in regenerating the filters; that is, after the filters have been operated for a considerable period the accumulated organic coloring matter is, as has been stated in other reports, removed by passing a solution of sodium hydroxide through the filter and then removing traces of this solution remaining in this sand by washing with water. A filter once impregnated with ferric hydroxide is stable in this respect throughout many years and the hydroxide is effective over and over again after each period of regeneration. This of course lessens the cost of the chemical materially compared with color removal by the usual rapid sand filter method by which the chemical once used is unavailable for further use. The following table shows the amount of chemicals used per gallon of water filtered by three filters that have now been operated for nine years and by a fourth filter, No. 535, which has been operated for two years.

Constructional Data on Color Removal Filters.

FILTER No.	Date Started.	Tons Ferric or Aluminum Sulphate per Acre.	Tons Ferric Hydroxide or Aluminum Hydroxide per Acre.	Depth of Sand (Feet).	Effective Size of Sand (m.m.)
488	May 14, 1917	64.5	34.5	4.0	.25
494	June 7, 1918	80.5 ¹	20.2	4.0	.25
496	Sept. 19, 1918	27.0	14.4	4.0	.25
535	Nov. 24, 1923	80.4	43.0	4.0	.25

¹ Aluminum sulphate.*Data on Operation of Color Removal Filters.*

FILTER No.	AVERAGE SINCE START.					Average Color, 1925.
	GRAINS PER GALLON OF WATER FILTERED.		Number of Times Treated.	Average Number of Days between Treatments.	Average Color.	
	Caustic Soda.	Ferric or Aluminum Sulphate.				
Canal ¹	—	—	—	—	.39	.37
488	.51	.07	49	54	.14	.12
494	.45	.10	47	47	.16	.14
496	.14	.03	12	166	.08	.07
535	.43	.45	8	63 ²	.10	.11

¹ Merrimack River water.² Calculated to five million rate.*Average Chemical Analyses.*

[Parts in 100,000.]

FILTER NUMBER.	Color.	AMMONIA.			NITROGEN AS —		Oxygen consumed.	Iron.	Alkalinity.	Carbon Dioxide.	Hydrogen Ion Concentration.
		Free.	ALBUMINOID.		Nitrates.	Nitrites.					
			Total.	In Sol.							
Canal	.37	.0106	.0162	.0098	.020	.0007	.60	.0767	0.7	0.8	6.2
488	.12	.0113	.0074	—	.024	.0010	.29	.0327	1.1	0.3	6.4
494	.14	.0089	.0072	—	.021	.0006	.30	.0291	1.1	0.6	6.4
496	.07	.0061	.0042	—	.024	.0004	.17	.0194	1.3	0.6	6.5
535	.11	.0122	.0062	—	.020	.0014	.25	.0206	1.4	0.4	6.6

Average Bacterial Analyses.

FILTER NUMBER.	BACTERIA PER CUBIC CENTIMETER.			PER CENT OF BACTERIA REMOVED.			B. Coli in 100 cc.
	4 Days 20° C.	24 hrs. — 37° C.		4 Days 20° C.	24 hrs. — 37° C.		
		Total.	Red.		Total.	Red.	
Canal	4,400	149	41	—	—	—	2,200
488	128	7	2	97.1	95.3	95.1	44
494	205	10	2	95.3	93.3	95.1	37
496	34	3	0	99.2	98.0	100.0	3
535	226	6	1	94.8	96.0	97.6	58

LAWRENCE CITY FILTERS.

As usual this report presents here the data in regard to the operation during the past year of the sand filters of the city of Lawrence. This filter plant is the largest in the State and treats one of the most polluted waters used as the source of a public water supply in this country. This supply has been taken from the Merrimack River since 1875. Since 1893 the water has been purified by slow sand filtration and for the past eight years the filtered water has been treated with chlorine as an additional safeguard. Two sand filters are in use, the older 2.2 acres in area is divided into three sections only one of which is covered; the newer is 0.75 of an acre in area and is of the usual concrete construction and covered. During 1925 a third modern covered filter, 0.75 of an acre in area, has been under construction. As the city has never employed a bacteriologist or chemist to have oversight of the work of these filters, considerable time is given to them by the staff at the Experiment Station, and many bacterial analyses are made each year, both of the applied water and of the filtered water collected at different points on the system. The average volume of water filtered daily during 1925 was 4,696,931 gallons. Liquid chlorine is applied at the pump-well and the average amount during the year was 0.96 parts per million.

The following tables present the average chemical and bacterial results of the river water and the effluents from the filter:—

Average Bacterial Analyses.

Merrimack River. — Intake of the Lawrence City Filters.

BACTERIA PER CUBIC CENTIMETER.			PER CENT OF BACTERIA REMOVED.			PER CENT OF SAMPLES CONTAINING B. COLI.					B. Coli in 100 cc.
Four Days 20° C.	TWENTY-FOUR HOURS, 37° C.		Four Days 20° C.	TWENTY-FOUR HOURS, 37° C.		.001 cc.	.01 cc.	0.1 cc.	1.0 cc.	10 cc.	
	Total.	Red.		Total.	Red.						
8,700	370	83	—	—	—	2	42	100	100	100	5,700
<i>Effluent from the Lawrence City Filter (Old Filter).</i>											
69	6	1	99.2	98.4	98.8	—	—	0	19	52	21
<i>Effluent from the Lawrence City Filter (New Filter).</i>											
40	3	0	99.5	99.2	100.	—	—	0	9	38	12
<i>Mixed Effluents as pumped to the Distributing Reservoir.</i>											
27	4	0	99.7	98.9	100.	—	—	0	3	9	3
<i>Water from the Outlet of the Distributing Reservoir.</i>											
60	4	0	99.3	98.9	100.	—	—	0	6	23	8
<i>Water from a Tap at Lawrence City Hall.</i>											
57	4	0	99.3	98.9	100.	—	—	0	2	21	4
<i>Water from a Tap at the Lawrence Experiment Station.</i>											
56	6	0	99.4	98.4	100.	—	—	0	1	15	3

Average Chemical Analyses.

Merrimack River. — Intake of the Lawrence City Filters.

[Parts in 100,000.]

Temperature (Degrees F.).	APPEARANCE.		AMMONIA.			Chlorine.	NITROGEN AS —		Oxygen consumed.	Iron.	Hardness.
	Turbidity.	Color.	Free.	ALBUMINOID.			Nitrates.	Nitrites.			
				Total.	In Sol.						
47	0.1	.37	.0132	.0194	.0117	.43	.017	.0023	.55	.0803	1.4
Effluent from Lawrence City Filter (Old Filter).											
45	0.0	.31	.0093	.0071	—	.56	.030	.0004	.39	.0805	1.5
Effluent from Lawrence City Filter (New Filter).											
45	0.0	.26	.0046	.0065	—	.46	.026	.0006	.39	.0370	1.4
Water from the Outlet of the Distributing Reservoir.											
48	0.0	.32	.0073	.0085	—	.56	.027	.0005	.37	.0765	1.4
Water from a Tap at Lawrence City Hall.											
50	0.0	.32	.0064	.0077	—	.56	.029	.0010	.37	.0768	1.4
Water from a Tap at the Lawrence Experiment Station.											
48	0.0	.31	.0047	.0069	—	.56	.029	.0002	.37	.0803	1.4

TREATMENT OF SEWAGE.

During the year groups of filters, tanks, etc., have been in operation for research work in regard to sewage purification and to illustrate the different methods used. Sand, contact and trickling filters, septic tanks and the activated sludge tank have all been in operation, their results studied, and efforts made to add to and improve our knowledge of each process. In the present report data concerning sand filters, septic tanks and the activated sludge process are alone presented.

Activated Sludge.

There was developed at the Station in 1911 and 1912 a process of sewage purification dependent for its success upon the vigorous aeration of the sewage and the circulation of live or activated growths and sludge. From the date of its discovery the process has grown in favor and has been adopted by many municipalities in England and this country, the largest plant in complete operation at the present time being that of the city of Milwaukee, Wis. This plant is capable of treating 75,000,000 gallons of sewage daily and its cost of construction has been approximately \$8,000,000. Indianapolis, Chicago and other cities have built sewage treatment plants of this type. The first work at Lawrence was carried on in bottles and carboys and later in tanks described in the 1912, 1913 and subsequent reports of that Station. After the first work it was noticed that when in addition to the circulated sludge, growths became attached to the vessels in which the process was being carried on, clearer and better purified effluents were obtained than by sludge circulation alone, hence attempts were made to improve the process by operating tanks containing layers of slate sometimes horizontal and sometimes vertical held an inch or more apart. The attached growths seemed, however, in the larger tanks to cause little additional purification. As all of our work during the first two years was carried on in glass vessels in the light, growths of green algæ became mixed with the brown and gray growths or sludge. When tank experiments began to be made, however, all work was of course carried on in the dark, hence green growths did not appear but as successful results were obtained as when the green algæ were mixed with the brown and gray sludge. In this early work air was applied in a number of ways. One of the first methods was the use of individual jets using deflecting plates or baffles to create good circulation of the sewage. An ejector was also used which took sewage and sludge from the bottom of the tank, raised it above the surface of the sewage in the tank and caused it to flow over an incline back into the tank. This gave both aeration and circulation. The air was afterwards introduced through perforated pipes containing many orifices

placed on the bottom of the tanks and the air coming from these orifices was deflected and good circulation of the sewage and sludge was obtained. Finally, filtros plates were used as is now common in municipal activated sludge plants.

In all of this work about 20 per cent of the capacity of the tank was kept filled with wet sludge in order to obtain the best results and tanks were operated first on the fill and draw plan and afterwards continuously. Experiments were made in regard to operation at different temperatures, with different volumes of air applied per gallon of sewage purified, etc. In general the effluents from most of our tanks were clear and fairly well nitrified. At the present time there is in operation at the Station an activated sludge tank (No. 485) started in 1917. It is 75 inches deep, divided into three compartments, with a total capacity of approximately 700 gallons. Sewage is theoretically six and one-half hours passing through this tank and receives about 0.55 cubic foot of air per gallon of sewage per hour. The filtros plates used are clamped to cast iron boxes from which they can be readily removed for cleaning and this cleaning with us is done by treatment with hot alkaline permanganate followed by hydrochloric acid.

Averaging the results since 1917 dry sludge has been removed from this tank at the rate of 894 pounds for each million gallons of sewage passed through the tank, and the average nitrogen content of this sludge has been 5.6 per cent and the fatty content 6.5 per cent. Tables showing the average analyses of the sewage applied to and the effluent from this tank during 1925 are given here. It will be noticed that nitrification was fairly active during the year and that the effluent from the tank had but 2.6 parts of matters in suspension.

Average Analyses.

Sewage applied to Activated Sludge Tank No. 485.

[Parts in 100,000.]

APPEARANCE.		AMMONIA.			KJELDAHL NITROGEN.		Chlorine.	NITROGEN AS —		Oxygen consumed.	Bacteria per Cubic Centi- meter.
Turbidity.	Color.	Free.	ALBUMINOID.		Total.	In Sol.		Nitrates.	Nitrites.		
			Total.	In Sol.							
—	—	3.20	.53	.30	.93	.54	7.6	—	—	3.62	2,170,000
<i>Effluent from Activated Sludge Tank No. 485.</i>											
0.7	.61	1.81	.18	.12	.32	.22	7.9	.23	.0538	1.18	310,000

Average Solids.

Sewage applied to Activated Sludge Tank No. 485.

[Parts in 100,000.]

UNFILTERED.			FILTERED.			IN SUSPENSION.		
Total.	Loss on Ignition.	Fixed.	Total.	Loss on Ignition.	Fixed.	Total.	Loss on Ignition.	Fixed.
53.4	26.6	26.8	36.8	16.0	20.8	16.6	10.6	6.0
<i>Effluent from Activated Sludge Tank No. 485.</i>								
36.4	13.7	22.7	33.8	12.4	21.4	2.6	1.3	1.3

Operation of Household Septic Tanks.

The purification of municipal sewage by so-called septic tanks began to be studied quite thoroughly nearly thirty years ago and many large tanks of this description were put in operation by different cities and towns in this country and abroad, especially in England. For municipal purposes the method has largely gone out of use as newer and more effective methods for the treatment and purification of sewage have been discovered and used. There seems to be a place, however, for this process in the disposal of small volumes of sewage from houses, factories, hotels, etc., and tanks treating such sewage appear to be efficient in most instances. In order to have data of our own on this subject covering the operation of such tanks through a series of years two small septic tanks were put in operation

in June, 1920, and have been continued up to date. These tanks are of concrete construction and are designated as Tanks Nos. 507 and 508. The first is 4 feet long, 2 feet wide and 40 inches deep, with a sloping bottom and a capacity of 185 gallons; the second is constructed as the first but consists of two compartments and has a total capacity of 370 gallons. The sewage enters each tank through trapped inlets and discharges through a pipe reaching 15 inches below the surface of the sewage in the tank. A baffle is placed one-third of the distance from the inlet to the outlet and reaches to within eight inches of the surface of the sewage and within ten inches of the bottom of the tank. A trapped outlet is provided for the escape of gas, and air is carefully excluded. The first tank receives fresh household sewage and the second Lawrence city sewage, — a stale sewage. Both tanks are so operated that theoretically the sewage is held within each for two days. During their entire period of operation the effluents from both tanks have been remarkably clear, this being due not only to the deposition within them of a large part of the coarse suspended matter but also by the coagulation of the colloidal matter which when present causes effluents to appear cloudy and milky. Since being put in operation the first tank has reduced the albuminoid ammonia in solution of the applied sewage 50 per cent and the second tank, 55 per cent. The reduction of the total albuminoid ammonia has of course been much greater than this. Following tables show the character of the sewage applied to and the effluents from these tanks during 1925. While absolute sludge measurements have not been made during the year it is evident there has been but a slight increase in this deposit since the last measurement in April, 1924, in spite of the fact shown in the following tables that Tank No. 507 retained during the year 79 per cent of the matters in suspension in the applied sewage and Tank No. 508, 80 per cent.

Average Analyses.

Station Sewage applied to Closed Septic Tank No. 507.

[Parts in 100,000.]

AMMONIA.			KJELDAHL NITROGEN.		Chlorine.	Oxygen consumed.	Bacteria per Cubic Centimeter.
Free.	ALBUMINOID.		Total.	In Solution.			
	Total.	In Solution.					
5.51	1.18	.59	1.98	1.03	8.6	6.18	6,050,000
<i>Effluent from Closed Septic Tank No. 507.</i>							
5.10	.47	.30	.81	.53	7.2	3.14	1,760,000
<i>Regular Sewage applied to Closed Septic Tank No. 508.</i>							
3.78	.75	.39	1.33	.65	8.2	4.75	1,480,000
<i>Effluent from Closed Septic Tank No. 508.</i>							
2.65	.25	.17	.47	.29	6.5	2.09	600,000

Average Solids.

Station Sewage applied to Closed Septic Tank No. 507.

[Parts in 100,000.]

UNFILTERED.			FILTERED.			IN SUSPENSION.		
Total.	Loss on Ignition.	Fixed.	Total.	Loss on Ignition.	Fixed.	Total.	Loss on Ignition.	Fixed.
79.2	41.9	37.3	51.0	22.5	28.5	28.2	19.4	8.8
<i>Effluent from Closed Septic Tank No. 507.</i>								
49.6	25.3	24.3	44.4	22.4	22.0	5.2	2.9	2.3
<i>Regular Sewage applied to Closed Septic Tank No. 508.</i>								
66.8	34.0	32.8	39.9	17.9	22.0	26.9	16.1	10.8
<i>Effluent from Closed Septic Tank No. 508.</i>								
36.9	15.0	21.9	31.5	13.0	18.5	5.4	2.0	3.4

Filtration of Sewage.

As stated previously a large number of filters have been operated at the Station during the year and it is hoped that the results of their operation and the special studies made with them may at some time be summarized in a report as was previously done in each annual report of this Department. To do this adequately, however, would require much detailed description and many tables. It is, however, worth while to give here the results obtained during the year of the operation of sand Filters Nos. 1 and 4, which were first put in operation thirty-eight years ago, and of No. 9A put in operation thirty-five years ago. These filters, 1/200 of an acre in area, have been operated longer perhaps than any other sand filters now in existence and the data obtained by this long period of operation are of exceeding value although at the present time more rapid methods of sewage purification have to be adopted to economically and adequately care for the sewage of large municipalities. In New England, however, for small cities and large towns the method of sand filtration is still probably equal in results and more economical in practice than any other method.

Following tables show the quality of the effluents given by these filters during 1925 and a table is also given presenting the results of analyses of the sand from different depths in Filters Nos. 1 and 9A made in 1920 and 1925. While it would seem that there is a considerable increase at depths of 18 inches and below in Filter No. 1 similar figures have been given by analyses during many years of the life of this filter and always the sand has freed itself more or less from accumulated organic matter during some period or year of its operation. This filter is operated as easily now as at any time during the past thirty-five years and with the production of an effluent of about the average for its entire period of operation. The same can be said of Filters Nos. 4 and 9A.

*Average Analyses.**Effluent from Filter No. 1.*

[Parts in 100,000.]

TEMPERATURE (DEGREES F.).		AMMONIA.		Chlorine.	NITROGEN AS —		Oxygen con- sumed.	Alka- linity.	Bacteria per Cubic Centimeter.
Applied.	Effluent.	Free.	Albumi- noid.		Nitrates.	Nitrites.			
52	51	.3657	.0542	7.5	1.87	.0019	.46	—1.7	21,100
<i>Effluent from Filter No. 4.</i>									
52	50	.0260	.0113	6.3	1.61	.0099	.30	—0.8	770
<i>Effluent from Filter No. 9A.</i>									
52	53	.3234	.0377	7.6	1.49	.0022	.45	—0.1	12,000

Albuminoid Ammonia in Sand from Filters Nos. 1 and 9A.

[Parts in 100,000.]

DEPTH.	FILTER No. 1.		FILTER No. 9A.	
	1920.	1925.	1920.	1925.
Average first 12"	112.2	83.0	92.3 ¹	42.2
18"	41.1	68.2	8.5	22.4
24"	8.7	20.8	9.2	8.7
36"	7.0	11.3	4.4	5.9
48"	5.3	11.4	3.9	5.6
60"	3.8	6.1	3.9	4.2

¹ Nov. 26, 1920, one foot removed and washed. Replaced May 3, 1921. Albuminoid ammonia after washing 53.4.

STUDIES OF THE OXYGEN CONSUMED TEST.

As usual certain research work was carried on during the year in regard to chemical and bacterial methods of analysis and special studies made concerning the so-called oxygen consumed method for determining organic matter in water and sewage. Procedure in this method varies in different laboratories. In England the determination is usually made at a temperature of 80° F. but different lengths of time of digestion with permanganate are allowed, the more common practice appearing to be four hours. In America the practice generally followed is treat-

ment of the water at 212° F., that is, the boiling point, but the time of digestion with permanganate varies in different laboratories. The standard methods of analysis of the American Chemical Society and the American Public Health Association recommend digestion for thirty minutes. In this Division it has been the practice for many years to bring the sample to the boiling temperature, add permanganate and boil for five minutes. As comparisons are frequently made of waters and sewage analyzed in different laboratories the English and Massachusetts methods were studied during the past year and three hundred and twelve samples tested by each method. These samples were of sewage and of the effluents from sewage filters of different types and the results by our method were 70 per cent as great as those by the English four-hour 80° method on filter effluents, and 71 per cent as great on samples of sewage.

REPORT OF DIVISION OF FOOD AND DRUGS.

HERMANN C. LYTHGOE, *Director*.

The Food and Drug Division of the Massachusetts Department of Public Health has been engaged during the year 1925 in the usual routine work of the enforcement of the milk, food, drug, cold storage, slaughtering, bakery, soft drink, mattress, and coal laws, and in the examination of samples of liquor and narcotics submitted by police departments, as well as in the manufacture of arsphenamine and the examination of material submitted by the State Purchasing Agent.

The laboratory for the convenience of the State Purchasing Agent was added to the Food and Drug Division during 1923. A recommendation has been filed with the Commission that the laboratory be taken from the Department and handled by the Commission. The expense of doing work in this laboratory is vastly higher than that in the regular food and drug work and there is no advantage by way of economy or efficiency in keeping the laboratory in the Health Department.

The purchase laboratory examined 3,391 samples, of which 1,284 were submitted upon bids and 105 were submitted for information. The balance of 2,002 represented delivery samples, of which 828 were coal.

The appropriation for expenses was insufficient to carry out the work of the division during the entire year. This was evident as soon as the budget was reported, and instead of curtailing the work and spreading the era of loafing over the entire year, it was decided to carry out the work with the maximum degree of efficiency and then stop work when the money was gone. When the appropriation for shellfish became available, two inspectors were taken off the food and drug work and put on shellfish work for the balance of the year. The regular inspectional work ceased on October 15 and the balance of the inspectional force was then put upon work in relation to shellfish. This has resulted in a material reduction in the number of samples which otherwise would have been collected and also in a material reduction in the number of court cases.

No work was done in the Fall in connection with the illegal sale of eggs in spite of information received that cold storage eggs were being shipped from the West in unmarked cases and were being sold to the public as fresh at fresh egg prices. This information was authentic and if funds were available the violations could have been stopped.

The inspectors, however, collected 9,787 samples of milk, foods, drugs, and mattress fillings, in comparison with 8,175 samples collected during 1924. The laboratory force examined these samples, together with 9,454 samples of liquor, 113 samples of narcotics, etc., and 33 samples of coal, compared with 6,799 samples of liquor, 101 samples of narcotics, and 65 samples of coal examined during 1924. The total number of samples examined in 1925 was 19,387, compared with 15,140 examined in 1924.

There were 273 prosecutions, of which 242 resulted in conviction; 19 defendants were found not guilty; 1 defendant defaulted and left the state; and another case was quashed.

The following table gives a summary of the court cases disposed of during the year. For the list of prosecutions see Table 1.

Summary of Prosecutions.

	Conviction.	Discharged.	Quashed.	Defaulted.
Milk:				
Low standard	65	2	—	—
Cream removed	8	—	—	—
Watered	29	1	—	—
Paris green in milk can	1	—	—	—
Butter, low standard	3	—	—	—
Maple Sugar	3	1	—	—
Sulphites in foods:				
Dried fruits	9	—	1	—
Hamburg Steak	12	—	—	—
Sausages	6	—	—	—
Sausages:				
High cereal	6	—	—	—
Color	4	1	—	—
Decomposed	2	—	—	1

Summary of Prosecutions — Concluded.

	Conviction.	Discharged.	Quashed.	Defaulted.
Soft Drinks:				
Saccharine	7	5	—	—
Unlicensed factory	2	—	—	—
Unsanitary factory	2	—	—	—
Cattle Food	1	—	—	—
False Advertising:				
Calves Liver	1	—	—	—
Maple Syrup	1	—	—	—
Milk	1	—	—	—
Eggs	4	—	—	—
Misbranding Eggs	1	—	—	—
Cold Storage:				
Eggs	64	2	—	—
All others	2	—	—	—
Slaughtering	5	4	—	—
Drugs	3	—	—	—
Mattresses	—	2	—	—
Totals	242	18	1	1

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The number of liquor samples submitted is becoming alarmingly large and there is a probability that this number will increase considerably during the next fiscal year. In June last an estimate was made of the probable amount of liquor to be submitted during the calendar year. This estimate was made upon logarithmic differences taken at six months intervals, beginning December 1922. The estimate for the calendar year was 9,317. The actual number of samples submitted during the calendar year was 9,454. Based upon this same method of estimation, we may expect 11,219 samples of liquor to be submitted during the next calendar year. If we plot the existing figures upon probability plotting paper, the estimate for the calendar year 1926 is 10,950 samples. In order to do this additional amount of work, it will be necessary to increase the analytical force of the division and to increase the size of the laboratory. This can be readily done by transferring the coal grinding work for the Department of Administration and Finance to some other location in the building. With the addition of a stenographer and the possible appointment of an additional chemist, the additional work can be very readily taken care of at a labor cost of 66.4c per sample, including the cost of expert testimony in court. Either the force must be increased or the work must be stopped.

The character of liquor samples submitted has undergone a slight change. There has been an increase in the per cent of samples of beer and wine, and a decrease in the per cent of samples of distilled spirits. There has, however, been an actual increase in numbers of all classes of samples except the miscellaneous liquor. The following table gives the classification of liquor samples submitted during the past five years.

Variation in Samples of Liquor submitted by Police Departments.

	1921.	1922.	1923.	1924.	1925.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Beer	9.4	8.4	11.7	15.3	18.8
Cider	3.7	1.2	1.6	2.1	2.2
Wine	6.7	6.1	6.9	7.4	8.5
Distilled Spirits	61.4	74.9	67.0	59.4	56.9
Flavoring Extracts	5.3	1.0	0.6	0.8	0.1
Alcohol	5.8	4.6	9.3	12.7	10.6
Miscellaneous	7.7	3.8	2.9	2.3	2.9
Totals	100.0	100.0	100.0	100.0	100.0
Total Number of Samples	3,831	5,766	6,367	6,799	9,454

Table 2 gives a list of cities and towns submitting ten or more samples during the year, together with the character of the sample submitted by each such locality.

There were collected and examined 6,813 samples of milk, of which 2,254 were below the legal standard. Included among these samples are 143 samples from which the cream had been removed in whole or in part, and 151 to which water had been added. This apparently high ratio of samples below the legal standard should not, however, reflect upon the quality of the market milk. Fully 25% of

the samples collected are obtained from suspected sources. Many samples are obtained from the milk rooms of wholesale milk dealers before the milk is mixed. After the mixing of the milk of various dairies, the low standard milk will disappear, being brought up to standard by the addition of milk from dairies giving very high quality milk. Less than 10% of the milk collected contains less than 11.5% of total solids.

Considerable work has been done in connection with the sale of milk by restaurants. A person purchasing a glass of milk in a restaurant is entitled to receive a glass of whole milk. It has been characteristic of the restaurant keeper to place milk intended for sale by the glass in a cylindrical tank containing an ice jacket. The milk is then drawn from the bottom of the tank by means of a spigot. The purchaser of the milk will obtain a glass of whole milk if it is drawn within fifteen minutes of the time the can of milk is poured into the container, after which time he gets skimmed milk. This is the invariable explanation given by the restaurant keeper after he receives notice that he has been selling milk in violation of the law. These restaurant cases were prosecuted under the standard provisions of the law rather than under the adulteration provisions. The standard provisions carry a maximum fine of fifty dollars, whereas the adulteration provisions carry a minimum fine of fifty dollars.

The inspectors collected 6,305 samples of milk in which no adulteration has been detected. The average composition of these samples was 12.30% total solids, 3.76% fat, and 8.54% solids not fat. The highest monthly average was during February, when 406 samples were collected with an average solids of 12.67%, an average fat of 3.92%, and an average solids not fat of 8.75%. The poorest milk was collected during June, — 665 samples containing an average solids of 12.12%, average fat of 3.68%, and average solids not fat of 8.44%.

The usual milk statistics will be found in Tables 3 and 4.

There were 2,699 samples of foods other than milk examined during the year, of which 529 were found to be adulterated or misbranded or otherwise in violation of the law. Included in these samples are 472 samples of shellfish taken in connection with the shellfish investigation before mentioned.

A number of samples of butter were examined, some of which were found to contain less fat than is specified by the statutes. These were samples of sweet butter intended for sale to the Hebrew trade. This butter is made by taking salted butter and washing out the salt, and no great attempt in many instances was made to squeeze out the surplus water. A number of samples of butter in storage were examined with a view of ascertaining the extent of rancidity in this butter. No prosecutions or seizures were made, although some of the butter had developed rancidity. This rancid butter, however, was not sold except after renovating.

A few years ago it was found that the retailer was selling dried, bleached fruits containing sulphur dioxide without making that fact known to the purchaser by stating upon the label of the package sold that the material contained sulphur dioxide. This was handled at that time by warnings, including the publication of a news item on the regulation in one of the trade papers. It was found that very few of the dealers had taken advantage of this warning. The first person who called for a hearing for violation of this regulation stated that his organization was not complying with the regulation because it had not been actively enforced. It was therefore deemed advisable to give the organization an idea of what "active enforcement" meant. The corporation in question did not furnish the branch stores with the necessary stamps for a period of about three weeks, and a second set of cases was obtained and two cases were brought into the Lawrence Court, resulting in conviction. An additional case was brought against this company in Pittsfield about two months later for a similar offence, resulting also in conviction. One case was tried in the Roxbury Court in a purely technical manner, resulting in the quashing of the complaint by the court. In this case the validity of the regulation was raised by the defendant. This regulation depends upon its similarity to an existing regulation of the Secretary of Agriculture. Apparently, in revising the regulation of the Department of Agriculture, the sulphur dioxide regulation was revoked. For this case, however, a certified copy of the regulation now in effect was obtained from the Secretary of Agriculture, and notwithstanding the

fact that this was filed with a letter from the Secretary, stating that a regulation was now in effect, the court held that while the Secretary of Agriculture believed he had such a regulation, in fact he did not. The dealer in this case, however, agreed to mark his packages, and the other case which the Division had prepared was not prosecuted. There were 82 samples collected without the necessary label, and 29 samples with the necessary label.

The egg samples reported were collected during the months of December, January, and February. There were the usual violations, including the sale of storage eggs without the necessary label; the sale of old eggs as fresh eggs; and a few sales of decomposed eggs. One of the inspectors found an incident of a man who was selling eggs at 50c per dozen, 60c per dozen, and 80c per dozen. When the inspector investigated the source of these eggs he discovered that they all came from the same case. The temptation to sell a storage egg as a fresh egg is particularly high, the general public having no objection to buying such eggs under such designation. The general public, however, does object to buying a storage egg if it is known that the egg is storage. It is therefore far easier and more profitable for the retail egg merchant to violate the law than to educate the public in the use of storage eggs.

The five samples of fish reported as adulterated were samples of shad obtained from storage. The owner of this shad questioned the physical examination by the inspector and desired a chemical examination. The chemical examination showed that not only was the fat rancid but that protein decomposition was well under way. These fish were therefore confiscated instead of being used for canning.

A considerable number of violations have been found in the sale of meat products, particularly hamburg steak and sausages. If sodium sulphite is used as a preservative in hamburger steak or in sausages, it must be stated upon the packages in which the material is sold. If one judges market conditions by statements made at hearings, it is astonishing how much dog meat is prepared with sulphites. Certain persons have claimed that the material which the inspector obtained was prepared for dog meat and was not prepared for human consumption. This explanation, however, in no way renders the person immune from prosecution because the food law applies equally to food intended for animals as well as for man and the dog is entitled to know if his meat is preserved as well as is the human being.

The sausages were adulterated either with sodium sulphite or with an excess quantity of cereal or by the addition of coloring matter. One case of calves' liver reported adulterated was in fact beef liver advertised as calves' liver at calves' liver price.

Six samples of olive oil out of 28 examined were found to be adulterated with cottonseed oil.

A special drive was made in connection with the soft drink industry. Included in this investigation was a sanitary investigation of the plants, ascertaining how many were licensed as provided by law, and a collection of samples for the detection of saccharine and for the determination of the total sugar content. Very few incidents of deficiency in sugar were found. There are a number of instances of dealers using saccharine, and wherever possible complaints were made either under the regulatory provision of the law or under the law itself. The cases entered in Peabody, Gardner, Westfield, Pittsfield, and Gloucester resulted in conviction. The cases entered in Chelsea and Worcester resulted in acquittal. The reasons for acquittal are purely technical, namely, that the regulation was invalid or saccharine did not constitute adulteration within the meaning of the law. All the persons prosecuted were fully familiar with the regulation; one had been in court before; and another was the son and former employee of a man who had been in court before. One factory was found to be operating without a license and was also in a very unsanitary condition. At the hearing involved in this case the local board of health was represented. The operator of the factory stated that after he received the notice of hearing he cleaned the factory, using upon the floor three iron scrapers of the kind used in taking ice off a sidewalk. The agent of the local board of health stated that he had never seen the factory because it was located a little distance from the center of the town. The two owners of this factory were prosecuted for operating without a license and for violation of the

sanitary food law. Conviction resulted in all cases with the imposition of a penalty in one case for violation of the sanitary food law.

In addition to the prosecutions for false advertising of foods in connection with the advertising of beef liver as calf liver, there were two other cases, one against a restaurant for advertising maple syrup upon the bill of fare, and furnishing a different kind of syrup, and another against a man for advertising Guernsey milk and furnishing milk other than Guernsey milk. The milk actually furnished was below the legal standard.

Four cases were prosecuted for false advertising of eggs. Three cases were prosecuted for the sale of decomposed sausages.

In connection with the work upon shellfish, sanitary inspections were made of shucking establishments and chemical examinations were made of the water content of shucked shellfish on sale in the state. This work is reported in detail in the shellfish report of this department. A number of hearings have been held relative to the sale of shellfish containing added water. The following statements made at these hearings may be of interest:

One retail dealer said that he put a little water into the shellfish because nine out of every ten people ask, "Please put in a little liquor." He therefore added one pint of water to every gallon of shellfish. In commenting upon this he said, "You cannot buy clams at \$1.50 per gallon and sell for 50c a quart, supply a container and make a profit." The particular clams involved in this case showed 25% of added water after they had been delivered by the wholesaler, and 36% of added water after they had been taken from the shell. Both the wholesaler and the retailer had done some watering, but the retailer had done the most.

One wholesaler volunteered the statement that the clams he sold came from a sewage polluted area where taking was prohibited, and declared his willingness to "stand behind the clams." These clams he purchased from the shuckers unwashed and did his own washing, probably on the theory that if you want a job done well, do it yourself. The finished product which he was selling was well soaked and contained 32% of added water in the drained clams, with considerable more water as "juice." One man who obtained clams from the State of Maine stated at the hearing that he had written to the Maine gentleman that water was cheaper in Massachusetts than in Maine. Another man stated that the oysters he was buying were full of shells and he also washed them because they were kind of thick. This washing he said took off the slime, for which he substituted nice, clean water.

Another retailer, who does his own shucking, soaked the drained clams to an extent of 25% plus additional "juice." He took the surplus shucked oysters from the crock every morning; washed them in a collander; and put them back into the crock. He said the customers want juice and will not buy dry oysters. He was asked if he ever informed his customers that the way to obtain oyster juice was to buy dry oysters and furnish the juice from the faucet. He said it never occurred to him to give such information to his customers. Another dealer stated that when he opened clams he found that about a pint and a half of juice per gallon ran out of the clams. He replaced this by water. The analysis, however, showed that instead of one and one half pints per gallon, he added one and one half quarts per gallon.

Another retailer, who insisted upon the necessity of washing, was asked why he did not wash with a 4% salt solution as previously advised. He said he tried it and found that the shellfish shrunk, indicating that the wholesaler had already done the watering. Another dealer stated that the clam liquor soon soured. He therefore poured off this liquor; washed the clams thoroughly; added some fresh water to make some more liquor by soaking out some more of the water soluble constituents of the clams and then repeated the process as often as was necessary until the clams were sold.

If a person takes 100 dry, unsoaked clams and measures the volume and then adds as much water as they will absorb, he will find that the volume will be increased about 64%. This will correspond to soaking to the extent of 35% of added water in the drained clams. A person buying these soaked clams, for example, would obtain but six clams rather than ten clams in a definite volume.

It was formerly the practice to soak scallops but fortunately this has practically ceased, the trade finding it advantageous to sell only dry scallops because of the wholesale prosecutions carried on by the Department of Public Health some years ago. Only a very few shuckers of scallops have tried watering this year. They have been caught and they will be prosecuted.

The shellfish dealer, whether he is a wholesaler or a retailer, can tell by a physical examination of the opened shellfish whether or not they have been soaked to any extent. Any claims, therefore, on the part of the wholesaler or the retailer that he sells his shellfish as he buys it should not be an excuse for letting him go unpunished.

The public can assist in this campaign by purchasing only dry clams and oysters rather than bloated, soaked, and waterlogged material, and if "liquor" is desired make it by the aid of the water faucet in spite of the advice of the dealer who wishes to sell tap water at fifty cents or more per quart. The general public is of the opinion that the juice which is sold with shellfish is in fact the juice which comes from the shellfish after opening. This is not the case. The shell liquor is always thrown away. The shellfish are then washed and any juice which may be there is in fact the water which is added by the person or persons engaged in handling or selling the fish.

There were 271 samples of drugs collected, of which 53 were found to be adulterated. These consisted of 2 samples of spirit of peppermint, 20 samples of lime water, and 30 samples of spirit of nitrous ether deficient in the active ingredients. The condition of the drug market is vastly superior to what it was twenty years ago.

BAKERIES.

Only 94 bakery inspections were made this year. These inspections were made in the towns of Andover, Boston, Cambridge, Chelsea, Clinton, Concord, Everett, Framingham, Gloucester, Haverhill, Ipswich, Malden, Marlborough, Newton, Rockport, and Waltham.

The following defects were noted:

Floors not properly constructed or maintained	41
Walls not properly constructed or maintained	28
Ceilings not properly constructed or maintained	18
Improper storage facilities	5
Apparatus not properly constructed or maintained	27
Stock not properly protected	31
Bakery products not properly protected	23
Too many flies in bakery	3
Unsatisfactory flour storage	10
Use of tobacco	4
Absence of garbage can	10
Animals in bakery	3
Toilet not in compliance with the law	21

More work should have been done upon bakeries but this work was curtailed because of lack of funds. The reports of the local boards of health giving summaries of inspections made by their agents indicate a reduction in bakery work carried on by local boards of health. It will therefore be necessary during the next fiscal year to pay particular attention to the bakeries in the state because a general cleaning up will be necessary.

COLD STORAGE.

Apart from violations of the cold storage egg law, the business of cold storage has been carried out in general compliance with the law. It was necessary, however, to make two prosecutions as previously described.

The storage of poultry in the Fall of 1924 was excessive, and in fact the general trend of poultry storage in this state has been greater than market conditions would warrant. Compared with the average holdings of the four preceding years, the fowl holdings showed a 600% surplus; the broiler holdings showed 240% surplus; the holdings of turkeys showed 440% surplus; and the holdings of roasting chickens showed 190% surplus. The inevitable result of this heavy storage was requests for extension of time. In view of the wholesale nature of these requests,

the matter was referred to the Public Health Council and a hearing was held by the Food and Drug Committee on August 26, at which representatives of the wholesale poultry trade appeared in order to show reasons why extensions should be granted. The poultry trade desired six month extensions on the ground that more frozen poultry was on hand than the general public could absorb. It was furthermore stated that the European situation was such that certain frozen poultry produced in this country, which generally went to England, could not go there this year because Russia and other European countries were able to land poultry in England at a price practically equivalent to what the producers were receiving at shipping points in this country. The poultry men further claimed that the embargo on live poultry last Winter curtailed consumption because of fear on the part of the general public that the poultry on the market at that time was dangerous to health. The New York situation was discussed and the poultry dealers stated that poultry could be kept in storage for one year in New York, irrespective of its date of storage, and the same applied to New Jersey. Poultry, therefore, could be shipped from New York to New Jersey or from New Jersey to New York for two years' time and still be in accordance with the provisions of the law. This is not the case in Massachusetts because only one year's storage is permitted except with the consent of the Department of Public Health. These poultry dealers gave estimated costs varying from 35c to 40c a pound, with a 4c additional charge for carrying the birds in storage. At the expiration of the twelve months' storage, these birds were selling at 25c a pound. The Council voted to grant reasonable extensions of time not exceeding four months. Extensions have been granted, the reports of which will be found in Table 7.

All of this poultry upon which extensions were granted was in proper condition for further extension. In only very few instances was the full four months' extension granted.

It will be noted that a number of extensions were granted for holding halibut in storage for four months. This halibut was Pacific coast halibut, a surplus of which was caught in 1924. The owners of this halibut said they would prefer to move the halibut to Massachusetts here for consumption rather than keep it in the West and move it here when desired for consumption. Extensions were therefore granted upon this material. It was expected that the closed season put upon halibut fishing would take care of this situation, but apparently more halibut is being taken during the open season than the public is willing to absorb at the prices at which the halibut is sold.

The general trend of cold storage holdings has been downward, due largely to a reduction in the holdings of meats. In 1923, for example, the meat holdings represented a maximum figure for the month of May of 21,582,372 pounds. The minimum figure that year was for November and was 6,827,018 pounds. The maximum holdings for meat in 1925 was for the month of March and was 18,085,200 pounds. The minimum holdings was for the month of November and was 3,492,674 pounds. The holdings of beef in 1921 averaged about 5,000,000 pounds and in 1925 averaged about 2,000,000 pounds. The holdings of lamb have been fairly uniform during the past four years, and the average holdings of pork have taken a slight drop. The butter holdings were excessive in 1924 and the early part of 1925 and it was anticipated that requests would be made for extension of time. The dealers, however, took all the surplus butter out of storage, and the holdings were reduced to normal by the first of May. On November 30, there were sixty-two licensed cold storage warehouses in the state.

SLAUGHTERING.

There have been no unusual violations of the slaughtering laws during the past year. The number of cattle, calves and sheep inspected have shown no material change. The number of hogs inspected, however, has declined considerably since 1920. In 1919 and in 1920, about 95,000 hogs were inspected each year under Massachusetts inspection. During the past three years this figure has varied between 56,000 and 60,000. There were more confiscations of cattle during 1923 and 1924 than in 1925. This increase was undoubtedly caused by the testing of cattle for the purpose of accrediting herds. The percentage of tuberculosis in these herds naturally decreases with time and the reactors on the second and third tests

are more liable to pass for food than are the reactors on the first test. A careful statistical study has been made of the percentage of confiscations in the various towns and in a number of localities the confiscations are so low as to lead us to suspect that the inspection is not what it should be.

One inspector who was renominated was disapproved by the Department because of stamping carcasses which he had not seen slaughtered. The board of health of the town asked the Department to reconsider this refusal and stated that conditions were such that the violation would not be repeated. The board sent a letter, stating that if we reconsidered our attitude and approved the nominee, he would be removed if any further violations were called to their attention. He was therefore approved and just about the end of the fiscal year it was found that he was stamping carcasses he had not seen killed, apparently with the knowledge and consent of the local board of health.

There were but few prosecutions for violation of the slaughtering laws. One case involving slaughtering in the absence of the inspector and another involving offering for sale unstamped meat, resulted in acquittal, although the evidence was apparently overwhelming for conviction. One case involved the sale of meat with a counterfeit stamp. This was discovered in a wholesale house in Boston, the manager of which promptly notified the Boston Health Department. The man delivering the meat was prosecuted in the Boston court for violating the law, and he was also prosecuted by this Department in the town where his slaughterhouse is located, for slaughtering in the absence of the inspector and for using a counterfeit stamp. This was a carcass which undoubtedly would have been condemned by the inspector and the stamp was made by the butcher by means of a colored pencil.

Two cases involving violations of the mattress law were tried in Boston. There were two partners selling mattresses labeled as containing wool. The evidence submitted showed that the mattresses contained a large per cent of cotton. The defence introduced evidence that in the trade the word "wool" meant "cotton" and the judge found the defendant not guilty. This is the same judge who found another mattress manufacturer not guilty a few years ago. In that case the mattress was labeled as containing "P. S. A." which the judge declared was the name of the material in the mattress. After this trial a letter was sent to the judge, calling his attention to a decision of the U. S. Supreme Court regarding a case involving the sale of cotton material under the name of "wool." In the case quoted the Supreme Court held that cotton was not wool. The judge did not acknowledge receipt of the letter.

The amount of coal samples submitted during 1925 was less than in 1924. Complaints, however, have begun to come in with some frequency during the month of November. A number of shipments were intercepted at the point of delivery and the dealers were advised not to accept the material. In a few instances the material was landed and samples were taken, representing what was actually being sold. One prosecution, to be tried during the coming year, will result from these samples. Many persons who were sending recovered refuse into this state, which material was to be sold as coal, have stopped the shipments of such material. These persons are apparently of the opinion that it is better to comply with the law rather than to fight it in the courts.

ARSPHENAMINE.

The production of arspfenamine has continued as heretofore, and the laboratory has been able to furnish sufficient arspfenamine and sulpharsphenamine to supply the demands. During the year we distributed 25,936 doses of arspfenamine computed as 0.6 gram per dose, and 21,563 doses of sulpharsphenamine computed as 0.76 gram per dose. The distribution of arsenicals reached a maximum for the twelve months ending September 30, 1923, with a distribution of 50,013 doses. This decreased to 41,398 doses for the year ending August 31, 1924, since which time it has been increasing, and for the twelve months ending November 30, 1925, 47,499 doses have been distributed. The peak of distribution comes during the month of March; the low point of distribution comes during the month of July. Another high point occurs in April. The very lowest point of distribution occurred during the month of February.

It is very probable that the distribution of arsenicals during the next fiscal year will exceed that of 1923.

During the last nine months of the fiscal year the arsphenamine laboratory prepared 60,000 ampoules of 1% silver nitrate solution for distribution by the department.

TABLE 1. — *For Sale of Milk not of Good Standard Quality.*

NAME.	Address.	Court.	Date.	Result.
Abdallah, A. Joseph	Tyngsborough	Lowell	May 6, 1925	Conviction.
Antipas, George S.	Cambridge	Cambridge	Aug. 4, 1925	Conviction.
Azariades, Eugene	New Bedford	New Bedford	Nov. 4, 1925	Conviction.
Bailey, William	Marblehead	Marblehead	Apr. 14, 1925	Conviction.
Barkas, William	Wellesley	Dedham	Aug. 31, 1925	Conviction.
Barmakian, Krikos	Oak Bluffs	Oak Bluffs	Aug. 11, 1925	Conviction.
Bradley, James F.	Haverhill	Haverhill	Dec. 11, 1924	Discharged.
Brennan, Edward	Gloucester	Gloucester	Jan. 28, 1925	Conviction. ¹
Cantales, James	Arlington Heights	Cambridge	Dec. 20, 1924	Conviction.
Carvell, Roy	Springfield	Springfield	Jan. 12, 1925	Conviction.
Cohen, Morris	Wellesley	Dedham	Aug. 31, 1925	Conviction.
Colas, Nicholas	Plymouth	Plymouth	Sept. 29, 1925	Conviction.
Colas, Nicholas	Plymouth	Plymouth	Sept. 29, 1925	Conviction.
Connor, Owen L.	Worcester	Worcester	Apr. 3, 1925	Conviction.
Connas, Christi	Chicopee	Chicopee	May 12, 1925	Conviction.
Converse Square Lunch Company	Malden	Malden	Apr. 22, 1925	Conviction.
Coussoule, Harry	Newburyport	Newburyport	June 19, 1925	Conviction.
David, Charles A.	Springfield	Springfield	Feb. 17, 1925	Conviction.
Delias, William	Pittsfield	Pittsfield	Feb. 20, 1925	Conviction.
Deni, Pasquale	Springfield	Springfield	June 9, 1925	Conviction.
Dineen, Daniel J.	Springfield	Springfield	July 30, 1925	Conviction.
Efstathion, Basilos	Holyoke	Holyoke	July 23, 1925	Conviction.
Engel, George	Framingham	Framingham	Dec. 23, 1924	Conviction.
Fazzi, Camello	Holyoke	Holyoke	July 18, 1925	Conviction.
Fortasakis, Spiros	Springfield	Springfield	Nov. 6, 1925	Conviction.
Gilhooley, Michael	Gardner	Gardner	Jan. 16, 1925	Conviction.
Girdis, Nicholas	Springfield	Springfield	June 9, 1925	Conviction.
Gray, Charles L.	Orange	Orange	Apr. 2, 1925	Conviction.
Green, Harry M.	Holyoke	Holyoke	July 23, 1925	Conviction.
Jarzynka, John	Salem	Salem	Mar. 27, 1925	Conviction.
Jordan, William	Tyngsborough	Lowell	May 11, 1925	Conviction.
Lampris, John G.	Cambridge	Cambridge	Aug. 4, 1925	Conviction.
Leclaw, John	Marblehead	Marblehead	Apr. 14, 1925	Conviction.
Lehtonen, Elvi	Fitchburg	Fitchburg	Dec. 12, 1924	Conviction. ¹
Leukowski, Frank	Northampton	Northampton	Mar. 25, 1925	Conviction.
Malnoski, Edward	Holyoke	Holyoke	July 23, 1925	Conviction.
Massaferro, Peter	Springfield	Springfield	May 26, 1925	Conviction.
Massaferro, Peter	Springfield	Springfield	June 9, 1925	Conviction.
McNiff, Patrick J.	Worcester	Worcester	Apr. 3, 1925	Conviction.
Meligidis, James	Springfield	Springfield	Nov. 6, 1925	Conviction.
Moore, Frank	Cambridge	Cambridge	Aug. 4, 1925	Conviction.
Nagle, John H.	Newton	Newton	Dec. 22, 1924	Conviction.
Nagle, John H.	Newton	Newton	Dec. 22, 1924	Conviction.
Nurmi, Abel	Fitchburg	Fitchburg	Dec. 12, 1924	Discharged.
Ossin, Ossin M.	Springfield	Springfield	Jan. 29, 1925	Conviction.
Ottani, Silvio	South Duxbury	Plymouth	July 9, 1925	Conviction.
Pappas, George	Holyoke	Holyoke	July 23, 1925	Conviction.
Parrasy, Arthur G.	Revere	Chelsea	Feb. 25, 1925	Conviction.
Polakkes, Angelos	Cambridge	Cambridge	Aug. 4, 1925	Conviction.
Pontes, Serapin J.	Fall River	Fall River	Apr. 21, 1925	Conviction.
Relihan, Christian J.	Marblehead	Marblehead	Apr. 14, 1925	Conviction.
Rezinewicz, Mike	Cambridge	Cambridge	Aug. 4, 1925	Conviction.
Robak, Walter S.	Chicopee Falls	Chicopee	May 12, 1925	Conviction.
Ruffall, Thomas	Worcester	Worcester	Mar. 13, 1925	Conviction.
Selva, Angelo	Springfield	Springfield	June 9, 1925	Conviction.
Sharon, Peter J.	Hudson	Hudson	Oct. 7, 1925	Conviction.
Shaugnessy, John P.	Taunton	Taunton	Dec. 19, 1924	Conviction.
Staebewski, George	Springfield	Springfield	Nov. 6, 1925	Conviction.
Tarjan, Jacob H.	Cambridge	Cambridge	Mar. 11, 1925	Conviction. ¹
Tashjian, Nisham	Springfield	Springfield	July 30, 1925	Conviction.
Thomasian, Arakel	Worcester	Worcester	Apr. 3, 1925	Conviction.
Trask, Fred O.	Sterling	Leominster	Oct. 14, 1925	Conviction. ¹
Waldorf System Inc.	Cambridge	Cambridge	Aug. 27, 1925	Conviction.
Welsh, Thomas J.	Springfield	Springfield	Jan. 12, 1925	Conviction.
Yannakopoulos, Peter	Cambridge	Cambridge	Sept. 24, 1925	Conviction.
Zaruk, Charles	New Bedford	New Bedford	Nov. 4, 1925	Conviction.
Zirasnska, Adam	Norwood	Dedham	Mar. 16, 1925	Conviction.

For Sale of Milk from which a Portion of the Cream had been removed.

Foisy, Arthur	Cheshire	Adams	July 22, 1925	Conviction. ²
Himel, Samuel	Worcester	Worcester	Dec. 12, 1924	Conviction.
Katowski, John	West Brookfield	East Brookfield	Sept. 11, 1925	Conviction.
Lewis, Earl A.	Fall River	Fall River	May 13, 1925	Conviction.
Noke, James & Nicholas				
Glogeni	Watertown	Waltham	Feb. 18, 1925	Conviction.
Skorupski, Anthony	Worcester	Worcester	Dec. 12, 1924	Conviction.
Thomas, Charles & Peter Lases	Worcester	Worcester	Dec. 12, 1924	Conviction.
Waldorf System Incorporated	Fall River	Fall River	May 5, 1925	Conviction.

¹ Appealed.² Sentence suspended.

For Sale of Milk containing Added Water.

NAME.	Address.	Court.	Date.	Result.
Antunes, George E.	Wakefield	Malden	Aug. 12, 1925	Conviction.
Bustead, George W.	Burlington	Woburn	Mar. 19, 1925	Conviction. ¹
Butterworth, Prescott C.	Somerset	Fall River	Mar. 6, 1925	Conviction.
Corey, Sied	Holliston	Framingham	May 29, 1925	Conviction.
Cowing, Frank W.	Weymouth	Quincy	July 7, 1925	Conviction.
Dorsey, Frank	Erving	Orange	July 3, 1925	Conviction.
Gallugi, Ralph	Wakefield	Malden	Aug. 12, 1925	Conviction. ²
Gates, Norman A.	Danvers	Salem	June 24, 1925	Conviction.
Gexler, Jacob	Gill	Greenfield	July 22, 1925	Conviction.
Gilchrist, Raymond	Fall River	Fall River	Dec. 30, 1924	Conviction. ¹
Henry, William	Wakefield	Malden	Aug. 12, 1925	Discharged.
Hibbard, Bertram J.	Hardwick	East Brookfield	Sept. 11, 1925	Conviction.
Jeffries, William J.	Orange	Orange	July 3, 1925	Conviction.
Keating, Patrick J.	Burlington	Woburn	Mar. 19, 1925	Conviction. ¹
Kent, Clarence E.	Marshfield	Plymouth	July 9, 1925	Conviction.
Latham, Thomas E.	Chelmsford	Lowell	Feb. 11, 1925	Conviction.
Lee, Fern H.	Millis	Walpole	May 15, 1925	Conviction.
Lemos, Antone	Acushnet	New Bedford	Apr. 24, 1925	Conviction.
Martin, John	South Somerset	Fall River	May 5, 1925	Conviction.
Mederos, Manuel	Swansea	Fall River	Oct. 8, 1925	Conviction.
Nelson, Axel	Pittsfield	Pittsfield	Oct. 26, 1925	Conviction.
Noons, Patrick	Rehoboth	Taunton	Feb. 24, 1925	Conviction.
Pikul, Joseph	Dudley	Webster	June 25, 1925	Conviction.
Porter, Max	Salem	Salem	Feb. 18, 1925	Conviction. ¹
Rogers, Manuel J.	Oak Bluffs	Oak Bluffs	Sept. 4, 1925	Conviction.
Sinkewicz, Charles	Dunstable	Lowell	May 6, 1925	Conviction.
Smith, Harry E.	So. Williamstown	Pittsfield	Aug. 18, 1925	Conviction.
Vickery, William A.	Attleboro	Attleboro	Sept. 10, 1925	Conviction.
Vickery, William A.	Attleboro	Attleboro	Sept. 10, 1925	Conviction.
Visocchi, Agostino	Sudbury	Concord	Apr. 17, 1925	Conviction. ¹

Putting Paris Green in a Can intended to be used as a Milk Container.

Friedman, Samuel	Attleboro	Attleboro	Sept. 10, 1925	Conviction.
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For Sale of Adulterated Foods Other than Milk.

BUTTER.

(Contained excess water.)

Whiting Milk Companies	Charlestown	Chelsea	Apr. 28, 1925	Conviction.
Whiting Milk Companies	Charlestown	Chelsea	Apr. 28, 1925	Conviction.
Whiting Milk Companies	Charlestown	Malden	June 23, 1925	Conviction.

DRIED FRUITS.

(Contained sulphur dioxide.)

John T. Connor Company	Roxbury	Roxbury	Apr. 29, 1925	Quashed.
Economy Grocery Stores Company	Chelsea	Chelsea	Mar. 25, 1925	Conviction.
The Ginter Company	Boston	Boston	Mar. 12, 1925	Conviction.
The Great Atlantic & Pacific Tea Company	Lawrence	Lawrence	Mar. 31, 1925	Conviction. ³
The Great Atlantic & Pacific Tea Company	Lawrence	Lawrence	Mar. 31, 1925	Conviction.
The Great Atlantic & Pacific Tea Company	Pittsfield	Pittsfield	May 20, 1925	Conviction.
Houghton & Dutton	Boston	Boston	Mar. 12, 1925	Conviction.
Manhattan Market	Cambridge	Cambridge	Mar. 11, 1925	Conviction.
Rose Tea Grocers Incorporated	South Boston	Boston	Mar. 13, 1925	Conviction. ¹
Winer, Hyman	Haverhill	Haverhill	Apr. 8, 1925	Conviction.

MAPLE SUGAR.

(Contained cane sugar.)

Chipas, Peter	Worcester	Worcester	May 8, 1925	Discharged.
Christoupolos, Efstathio	Lowell	Lowell	May 6, 1925	Conviction.
Esmil, Hamad	Lowell	Lowell	May 6, 1925	Conviction.
Morin, Donat	New Bedford	New Bedford	Apr. 24, 1925	Conviction.

HAMBURG STEAK.

(Selling, or offering for sale, meat containing sodium sulphite in violation of the regulations of the Department of Public Health.)

Berow, Israel	Boston	Boston	Jan. 9, 1925	Conviction.
Bloome, Kapple	Holyoke	Holyoke	May 13, 1925	Conviction.
Cohen, Hyman	Lynn	Lynn	Jan. 29, 1925	Conviction.
Coltot, Hyman	Lynn	Lynn	Jan. 29, 1925	Conviction.
Finn, Abram	Chelsea	Chelsea	Jan. 27, 1925	Conviction.
Fradkin, Julius	Cambridge	Cambridge	Mar. 3, 1925	Conviction.
Gopin, Max	Chelsea	Chelsea	Jan. 27, 1925	Conviction.
Jacobson, Max	Worcester	Worcester	Feb. 17, 1925	Conviction.
Kamagh, Peter	Chelsea	Chelsea	Jan. 27, 1925	Conviction.
Katz, Louis	Lynn	Lynn	Feb. 3, 1925	Conviction.
Robinson, Herman	Haverhill	Haverhill	Apr. 27, 1925	Conviction.
Smokler, Julius	Boston	Boston	Jan. 16, 1925	Conviction.

¹ Appealed.² Suspended to September 12th; defaulted December 5th.³ Continued for sentence.

*For Sale of Adulterated Foods Other than Milk — Concluded.*SAUSAGE.
[Contained starch in excess of 2 per cent.]

NAME.	Address.	Court.	Date.	Result.
Allard, Fred J.	Lowell	Lowell	Feb. 11, 1925	Conviction.
Borlen, George P.	Newburyport	Newburyport	Feb. 26, 1925	Conviction.
Lear, Joseph	Chelsea	Lynn	Feb. 27, 1925	Conviction.
Nelson, George	Gloucester	Gloucester	Feb. 10, 1925	Conviction.
Meyer, William P.	Somerville	Somerville	Mar. 18, 1925	Conviction.
Souda, Fred	Worcester	Worcester	Mar. 13, 1925	Conviction. ¹

SAUSAGE.
[Contained a compound of sulphur dioxide.]

Bauser, Joseph	Holyoke	Holyoke	May 13, 1925	Conviction.
Bloome, Kapple	Holyoke	Holyoke	May 13, 1925	Conviction.
Morrison, Hugh L.	Everett	Malden	Mar. 5, 1925	Conviction.
Morrison, James	Everett	Malden	Mar. 5, 1925	Conviction.
Morrison, James	Everett	Malden	Mar. 5, 1925	Conviction.
Tapor, Joseph	Holyoke	Holyoke	May 13, 1925	Conviction.

SAUSAGE.
[Contained coloring matter.]

Block, Meyer	Boston	Boston	Dec. 3, 1924	Conviction.
Cesati, Ermmano	Haverhill	Haverhill	Apr. 8, 1925	Conviction.
Epstien, Phillip	Boston	Boston	Dec. 3, 1924	Conviction.
Perlman, Joseph	Roxbury	Roxbury	Feb. 3, 1925	Conviction. ¹
Sichel Provision Company, Inc.	Roxbury	Roxbury	Jan. 14, 1925	Discharged.

SOFT DRINKS.
[Contained saccharine.]

Argeros, Arthur M.	Peabody	Peabody	Aug. 10, 1925	Conviction.
Brazell, Thomas (2 counts)	Gardner	Gardner	Mar. 18, 1925	Conviction.
Cataldo, Angelo	Revere	Chelsea	May 14, 1925	Discharged.
Gregor, Louis	Westfield	Westfield	June 9, 1925	Conviction.
Kaplan, Karl	Pittsfield	Pittsfield	July 23, 1925	Conviction.
Queen, Jacob D.	Worcester	Worcester	May 8, 1925	Discharged.
Robbins, Harry	Worcester	Worcester	May 8, 1925	Discharged.
Robinovitz, Frank	Worcester	Worcester	May 8, 1925	Discharged.
Roscoe, Sylvester	Worcester	Worcester	May 26, 1925	Discharged.
Schab, John	Westfield	Westfield	June 9, 1925	Conviction.
Sears, Joseph	Rockport	Gloucester	May 13, 1925	Conviction.
Wilson, Thomas	Rockport	Gloucester	May 13, 1925	Conviction.

OPERATING A SOFT DRINK FACTORY WITHOUT A PERMIT FROM THE LOCAL BOARD OF HEALTH.

Fisher, Albert W.	Waltham	Waltham	Sept. 4, 1925	Conviction.
Fisher, Earl L.	Waltham	Waltham	Sept. 4, 1925	Conviction.

ILLEGAL SALE OF CATTLE FOOD.

Diehl & Son, F., Incorporated ²	Wellesley	Dedham	May 7, 1925	Conviction.
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VIOLATION OF SANITARY FOOD LAW.

Fisher, Albert W.	Waltham	Waltham	Sept. 4, 1925	Conviction.
Fisher, Earl L.	Waltham	Waltham	Sept. 4, 1925	Conviction.

False Advertising.

BEEF LIVER ADVERTISED AS CALF LIVER.

Lagrange St. Public Market	Boston	Boston	Feb. 10, 1925	Conviction. ²
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MAPLE SYRUP.

Waldorf System Incorporated	Springfield	Springfield	Dec. 4, 1924	Conviction.
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MILK.

Indessi, Angelo	Springfield	Springfield	June 9, 1925	Conviction.
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Eggs.

FALSE ADVERTISING. — SALE OF EGGS WHICH WERE NOT FRESH AS FRESH EGGS.

Kronick, Meyer	North Adams	North Adams	Feb. 13, 1925	Conviction.
National Butchers Company	Beverly	Salem	Jan. 8, 1925	Conviction.
Thrift Stores, Incorporated	Springfield	Springfield	Dec. 4, 1924	Conviction.
Van Dyk Company, James	Springfield	Springfield	Dec. 4, 1924	Conviction.

MISBRANDED.

Cooper & Sisson, Incorporated	Providence, R. I.	Fall River	Feb. 3, 1925	Conviction. ¹
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¹ Appealed.² Evidence supplied by Massachusetts Agricultural Experiment Station; prosecution made on request by this Department.

Eggs — Concluded.

SELLING COLD-STORAGE EGGS WITHOUT MARKING THE CONTAINER.

NAME.	Address.	Court.	Date.	Result.
Abrahms, Morris	Pittsfield	Pittsfield	Dec. 5, 1924	Conviction.
Abu, Antonio	Framingham	Framingham	Dec. 23, 1924	Conviction.
Andrews, Benjamin A.	Pittsfield	Pittsfield	Dec. 5, 1924	Conviction.
Bajjier, Frank	Chicopee	Chicopee	Dec. 10, 1924	Conviction.
Bevilacqua, Frank	Pittsfield	Pittsfield	Dec. 5, 1924	Conviction.
Blazewicz, Stelne	Lowell	Lowell	Feb. 2, 1925	Conviction.
Boreck, William	New Bedford	New Bedford	Jan. 28, 1925	Conviction.
Bryll, Joseph	New Bedford	New Bedford	Jan. 16, 1925	Conviction.
Cranshaw, William	Taunton	Taunton	Dec. 19, 1924	Conviction.
Cushing, Louis	Lowell	Lowell	Jan. 26, 1925	Conviction.
Demchuck, Samuel	Cambridge	Cambridge	Jan. 20, 1925	Conviction.
Diorio, George	Boston	Boston	Dec. 3, 1924	Conviction.
Doyle, Lewis H.	Arlington	Cambridge	Dec. 30, 1924	Conviction.
Dubiel, Frank R.	Chicopee	Chicopee	Dec. 19, 1924	Conviction.
Fernandes, Ahiler	New Bedford	New Bedford	Jan. 16, 1925	Conviction.
Firger, Morris	Boston	Boston	Dec. 3, 1924	Conviction.
Friedlander, David	Cambridge	Cambridge	Jan. 20, 1925	Conviction.
Grace, Anthony	Cambridge	Cambridge	Mar. 3, 1925	Conviction.
Greenstein, Joseph	New Bedford	New Bedford	Jan. 16, 1925	Conviction.
Greenstein, Max	New Bedford	New Bedford	Jan. 16, 1925	Conviction.
Inglis, John J.	Lowell	Lowell	Feb. 11, 1925	Conviction.
Jesus, Joseph	New Bedford	New Bedford	Jan. 16, 1925	Conviction.
Koufogabos, Arthur	Lowell	Lowell	Feb. 11, 1925	Conviction.
Krasnoff, William	Cambridge	Cambridge	Jan. 20, 1925	Conviction.
Kraus, Max	Chicopee	Chicopee	Dec. 19, 1924	Conviction.
Kuska, John	Chicopee	Chicopee	Dec. 19, 1924	Conviction.
Kussell, Morris	Roxbury	Roxbury	Dec. 16, 1924	Discharged.
Larivere, Charles J.	New Bedford	New Bedford	Jan. 16, 1925	Conviction.
Lasczeuski, Joseph	Lowell	Lowell	Feb. 2, 1925	Conviction.
Leader, Philip	Chicopee	Chicopee	Dec. 19, 1924	Conviction.
Leitao, Antonio	New Bedford	New Bedford	Jan. 16, 1925	Conviction.
Leitao, Antonio	New Bedford	New Bedford	Jan. 16, 1925	Conviction.
Levenson, Louis	Worcester	Worcester	Feb. 17, 1925	Conviction.
L'Hereux, Donat	Salem	Salem	Feb. 18, 1925	Conviction.
Lipsky, Abram	Boston	Roxbury	Dec. 16, 1924	Conviction.
Lusnia, Stanley	Chicopee	Chicopee	Dec. 19, 1924	Conviction.
Lutkewicz, Felix	Cambridge	Cambridge	Jan. 20, 1925	Conviction.
Mann, Charles	Fitchburg	Fitchburg	Dec. 12, 1924	Conviction.
Mello, Joseph D.	New Bedford	New Bedford	Jan. 16, 1925	Conviction.
Mellor, Clifford D.	Stoneham	Woburn	Feb. 13, 1925	Conviction.
Mendes, Manuel J.	New Bedford	New Bedford	Jan. 16, 1925	Conviction.
Mihalakas, Harris	Salem	Salem	Feb. 10, 1925	Conviction.
Miller, Hyman	New Bedford	New Bedford	Jan. 16, 1925	Conviction.
Moniz, Antonio B.	New Bedford	New Bedford	Jan. 16, 1925	Conviction.
Moscatelli, Louis	Framingham	Framingham	Dec. 23, 1924	Conviction.
Mozukl, Steve	Lawrence	Lawrence	Jan. 19, 1925	Conviction.
Mysleivy, Peter	Salem	Salem	Dec. 10, 1924	Conviction.
Nanopoulos, Andrew E.	New Bedford	New Bedford	Jan. 16, 1925	Conviction.
Niemiec, Stanley F.	New Bedford	New Bedford	Jan. 16, 1925	Conviction.
Nobrega, Peter	Cambridge	Cambridge	Mar. 3, 1925	Conviction.
Pladziewicz, Joseph	Cambridge	Cambridge	Mar. 3, 1925	Conviction.
Robinson, Morris	Boston	Roxbury	Dec. 16, 1924	Conviction.
Rogers, Caesar F.	New Bedford	New Bedford	Jan. 16, 1925	Conviction.
Rostler, Bennie	Lowell	Lowell	Feb. 16, 1925	Conviction.
Savas, James	Fitchburg	Fitchburg	Dec. 12, 1924	Conviction.
Scaff, Joseph	Pittsfield	Pittsfield	Dec. 5, 1924	Conviction.
Serafino, Tarini	New Bedford	New Bedford	Jan. 16, 1925	Conviction.
Sroka, Joseph	Chicopee	Chicopee	Dec. 19, 1924	Conviction.
Tarlo, Emma	Salem	Salem	Dec. 10, 1924	Conviction.
Vechiarelo, Augustus	Cambridge	Cambridge	Jan. 20, 1925	Conviction.
Walker, Chester E.	Westfield	Westfield	Jan. 6, 1925	Conviction.
Weiner, Samuel	Chicopee Falls	Chicopee	Jan. 13, 1925	Discharged.
Weinstein, Samuel	Roxbury	Roxbury	Dec. 16, 1924	Conviction. ¹
Wydsa, John	Salem	Salem	Dec. 10, 1924	Conviction.
Yalinsky, Martin	Lowell	Lowell	Jan. 26, 1925	Conviction.

ABSENCE OF SIGN "COLD STORAGE EGGS."

Kantor, Moses	Chicopee	Chicopee	Dec. 19, 1924	Conviction. ¹
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For Sale of Decomposed Food.

SAUSAGE.

Derouin, Ernest J.	Springfield	Springfield	Apr. 8, 1925	Conviction.
Range, Bert S.	Westfield	Westfield	Jan. 6, 1925	Conviction.
Wozniak, Michael	Taunton	Taunton	Mar. 31, 1925	Defaulted. ²

For Sale of Drugs Deficient in Strength.

LIME WATER.

Mactavish, John R.	Cambridge	Cambridge	July 7, 1925	Conviction.
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SPIRIT OF NITRE.

Cangiano, Ralph	Boston	Boston	Feb. 4, 1925	Conviction.
Michaelson, Simon	Revere	Chelsea	Feb. 25, 1925	Conviction.

¹ Appealed.² Departed from the State.

For Violation of the Laws relative to Cold Storage.

HOLDING ARTICLES OF FOOD IN COLD STORAGE FOR A PERIOD LONGER THAN TWELVE MONTHS WITHOUT THE CONSENT OF THE DEPARTMENT OF PUBLIC HEALTH.

Name.	Address.	Court.	Date.	Result.
Hawkins, Lewis T.	Boston	Boston	Dec. 1, 1924	Conviction.

REPRESENTING COLD-STORAGE FOOD AS FRESH FOOD.

Mead, Harry W.	Norwood	Dedham	Mar. 16, 1925	Conviction.
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For Violation of the Laws relative to Slaughtering.

USING COUNTERFEIT STAMP.

Becker, Sebastian	Woburn	Woburn	Nov. 17, 1925	Conviction.
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SLAUGHTERING OR AUTHORIZING SLAUGHTERING IN THE ABSENCE OF INSPECTOR.

Becker, Sebastian	Woburn	Woburn	Nov. 17, 1925	Conviction.
Brown, James	Lunenburg	Fitchburg	Apr. 14, 1925	Discharged.
Razzaboni, Henry	Medway	Franklin	Jan. 17, 1925	Discharged.

SELLING, OFFERING FOR SALE, OR HAVING IN POSSESSION WITH INTENT TO SELL, UNSTAMPED MEAT.

Brodsky, Jacob	Fitchburg	Fitchburg	Apr. 14, 1925	Discharged.
Palozzzi, James	Taunton	Taunton	Apr. 22, 1925	Conviction.

AS INSPECTOR OF SLAUGHTERING VIOLATED THE REGULATIONS OF THE DEPARTMENT.

Snow, Fred L.	Oxford	Webster	Feb. 17, 1925	Discharged.
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SLAUGHTERING WITHOUT LICENSE.

Kaufman, Morris R.	Charlton	Southbridge	Dec. 19, 1924	Conviction.
Kaufman, Paltiel	Charlton	Southbridge	Dec. 19, 1924	Conviction.

For Violation of Mattress Laws.

Winer, Israel	Boston	Boston	Apr. 15, 1925	Discharged.
Winer, Samuel	Boston	Boston	Apr. 15, 1925	Discharged.

TABLE 2. — *Summary of Liquor Samples examined during 1925.*

	Beer.	Cider.	Wine.	Distilled Spirits.	Extracts.	Alcohol.	Miscel- laneous.	Total.
Amesbury	1	6	2	1	—	1	—	11
Arlington	1	—	5	4	—	—	—	10
Ashburnham	9	—	4	6	—	—	—	19
Athol	18	1	8	10	—	—	—	37
Avon	—	7	2	5	—	6	—	20
Ayer	12	3	7	18	—	10	4	54
Barre	—	13	2	2	—	—	—	17
Belmont	—	—	7	8	—	1	4	20
Beverly	13	—	14	13	—	5	1	46
Boston	215	2	135	2,038	4	427	92	2,913
Boylston	2	4	4	—	—	—	—	10
Braintree	4	—	2	10	—	5	—	21
Brookfield	2	—	—	7	—	1	—	10
Brookline	2	—	1	12	—	6	2	23
Cambridge	35	—	7	368	—	76	13	499
Chelsea	12	—	—	5	2	1	—	20
Chicopee	14	—	—	12	—	—	—	26
Clinton	10	—	8	6	—	—	1	25
Concord	1	1	3	3	—	2	—	10
Dedham	5	—	3	15	—	1	—	24
E. Longmeadow	2	1	14	18	—	1	—	36
Everett	5	—	4	36	—	4	3	52
Fall River	50	2	12	102	—	2	6	174
Fitchburg	34	—	28	7	2	9	1	81
Framingham	8	—	3	8	—	—	—	19
Franklin	6	—	5	3	—	—	—	14
Gardner	8	—	—	28	—	3	1	40
Gloucester	16	—	27	45	—	19	3	110
Greenfield	9	28	10	47	—	10	3	107
Groton	12	—	4	7	—	—	—	23
Haverhill	15	—	5	38	—	3	1	62
Holbrook	—	—	—	7	—	2	1	10
Holyoke	5	—	—	4	—	1	—	10
Hudson	7	—	6	9	1	1	1	25
Hull	7	—	—	3	—	—	—	10
Ipswich	—	4	3	10	—	—	—	17
Lawrence	162	—	8	69	—	12	4	255
Leominster	9	1	4	7	—	1	—	22
Lowell	283	4	12	311	—	31	28	669
Lynn	101	—	24	249	—	50	36	460
Malden	98	—	33	200	—	27	—	358
Mansfield	6	2	8	13	—	—	2	31
Marlborough	13	—	5	21	—	1	2	42
Medford	—	—	1	31	—	2	—	34
Medway	2	—	3	6	—	5	—	16
Middleton	8	—	2	4	—	—	—	14
Milford	23	—	5	13	—	6	1	48

TABLE 2. — *Summary of Liquor Samples examined during 1925* — Concluded.

	Beer. ¹	Cider.	Wine.	Distilled Spirits.	Extracts.	Alcohol.	Miscel- laneous.	Total.
Nabant	2	—	1	5	—	—	3	11
Natick	4	—	4	16	—	2	—	26
Needham	2	—	1	10	—	3	—	16
Newbury	—	6	1	3	—	—	1	11
Newburyport	7	8	3	7	2	3	2	32
Newton	2	—	1	11	—	3	1	18
Norwood	2	—	5	7	—	—	—	14
Orange	10	—	13	10	—	—	1	34
Palmer	3	2	4	7	—	1	—	17
Peabody	17	—	1	53	—	6	7	84
Pepperell	3	3	—	2	—	1	1	10
Pittsfield	6	1	4	44	—	4	1	60
Plymouth	—	—	—	10	—	2	—	12
Quincy	7	—	6	46	1	29	—	89
Randolph	2	—	4	7	—	4	1	18
Reading	—	—	—	11	—	4	—	15
Revere	10	—	2	24	—	5	—	41
Rockland	3	—	1	7	—	1	—	12
Rowley	3	7	—	—	—	—	—	10
Salem	17	—	4	103	—	28	4	156
Salisbury	22	—	2	6	—	2	—	32
Somerville	7	—	12	145	—	24	1	189
Southbridge	13	2	6	11	—	2	—	34
Springfield	38	1	13	186	—	19	3	260
Stoneham	4	—	7	14	—	3	—	28
Taunton	27	—	9	12	—	2	3	53
Uxbridge	7	—	1	3	—	—	—	11
Walpole	9	1	15	26	—	1	4	56
Waltham	4	—	11	27	—	18	2	62
Wakefield	3	—	20	32	—	6	2	63
Watertown	5	—	3	5	—	7	—	20
Webster	9	—	—	10	—	2	1	22
W. Newbury	—	7	—	10	—	2	—	19
W. Springfield	1	—	2	10	—	2	—	15
Westford	10	57	—	12	—	3	—	82
Weymouth	3	—	—	6	—	2	1	12
Wilmington	4	1	2	21	—	1	—	29
Winchendon	6	—	8	—	—	1	—	15
Woburn	11	—	2	29	—	5	—	47
Wrentham	—	—	1	9	—	1	—	11
Dept. Pub. Safety	143	20	147	253	1	42	15	621
Dist. Att. Middlsex.	1	—	4	183	—	1	—	189
Miscellaneous ¹	101	16	45	148	—	27	7	344
	1,773	211	805	5,380	13	1,001	271	9,454

TABLE 3. — *Summary of Milk Analyses for the Year 1925.*

Number above the Standard	4,559
Number below the Standard	2,254
	6,813
<hr/>	
Number having more than 15% of total solids	30
Number having between 14 and 15% total solids	127
Number having between 13 and 14% total solids	741
Number having between 12 and 13% total solids	3,661
Number having between 11 and 12% total solids	1,976
Number having between 10 and 11% total solids	228
Number having between 9 and 10% total solids	41
Number having between 8 and 9% total solids	7
Number having less than 8% total solids	2
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Number of samples having cream removed	143
Number of samples of watered milk	151
Number of samples containing dirt	1
Number of samples of skimmed milk below Standard	1

¹ From 78 cities and towns submitting less than 10 samples during the year.

TABLE 4. — *Composition of Average Milk not declared Adulterated.*

	Number of Samples.	Average Solids (Per Cent).	Average Fat (Per Cent).	Average Solids not Fat (Per Cent).
December	463	12.51	3.81	8.70
January	388	12.45	3.78	8.67
February	406	12.67	3.92	8.75
March	641	12.42	3.75	8.67
April	599	12.18	3.63	8.55
May	716	12.20	3.74	8.46
June	665	12.12	3.68	8.44
July	590	12.19	3.76	8.43
August	561	12.31	3.88	8.43
September	549	12.20	3.75	8.45
October	346	12.29	3.72	8.57
November	381	12.22	3.73	8.49
Totals	6,305	12.30	3.76	8.54

TABLE 5. — *Summary of Food Analyses for the Year 1925.*

CHARACTER OF SAMPLE.	Genuine.	Adulterated.	Total.
Butter	167	25	192
Canned Goods	1	3	4
Cider	3	2	5
Clams	140	114	254
Coffee	13	—	13
Condensed Milk	20	1	21
Cream	10	—	10
Cream of Tartar	1	—	1
Dried Fruits	29	82	111
Eggs	109	78	187
Fish	—	5	5
Flavoring Extracts	15	—	15
Honey	3	—	3
Ice Cream	12	—	12
Jam	1	—	1
Lard	7	—	7
Maple Sugar	21	4	25
Maple Syrup	26	—	26
Meat Products:			
Sausage and Hamburg Steak	780	66	846
Calf Liver	—	1	1
Miscellaneous Foods	35	3	38
Nuts	19	—	19
Olive Oil	22	6	28
Oysters	21	62	83
Quahogs	3	—	3
Scallops	115	17	132
Spices	18	—	18
Soft Drinks	495	43	538
Sugar	1	—	1
Vinegar	83	17	100
Totals	2,170	529	2,699

TABLE 6. — *Summary of Drug Analyses for the Year 1925.*

CHARACTER OF SAMPLE.	Genuine.	Adulterated.	Total.
Camphorated Oil	7	—	7
Citrate of Magnesia	1	—	1
Spirit of Peppermint	9	2	11
Hamamelis Water	3	—	3
Lime Water	50	20	70
Spirit of Camphor	11	—	11
Spirit of Nitrous Ether	111	31	142
Tincture of Iodine	22	—	22
Tincture of Jamaica Ginger	4	—	4
Totals	218	53	271

TABLE 7. — *Requests for Extension of Time granted on Goods in Cold Storage from December 1, 1924, to December 1, 1925.*

[Reason for such extension being that goods were in proper condition for further storage.]

ARTICLE.	Weight (Pounds).	Placed in Storage.	Extension granted to —	Name.
Butter	6,710	June 9, 1924	Aug. 9, 1925	Goldsmith-Stockwell Co.
Broilers	462	Sept. 22, 1924	Oct. 22, 1925	Batchelder & Snyder Co.
Broilers	545	Sept. 22, 1924	Oct. 22, 1925	Batchelder & Snyder Co.
Broilers	71	Sept. 23, 1924	Oct. 23, 1925	Batchelder & Snyder Co.
Broilers	551	Sept. 24, 1924	Oct. 24, 1925	Batchelder & Snyder Co.
Broilers	653	Sept. 24, 1924	Oct. 24, 1925	Batchelder & Snyder Co.
Broilers	63	Sept. 27, 1924	Oct. 27, 1925	Batchelder & Snyder Co.
Broilers	620	Sept. 4, 1924	Nov. 1, 1925	Berman & Co., Inc.
Broilers	1,175	Sept. 13, 1924	Dec. 13, 1925	Berman & Co., Inc.

TABLE 7. — *Requests for Extension of Time granted on Goods in Cold Storage from December 1, 1924, to December 1, 1925 — Continued.*

ARTICLE.	Weight (Pounds).	Placed in Storage.	Extension granted to —	Name.
Broilers . . .	478	Oct. 30, 1924	Jan. 30, 1926	Burr, S. L., Co.
Broilers . . .	655	Oct. 30, 1924	Jan. 30, 1926	Burr, S. L., Co.
Broilers . . .	863	Oct. 30, 1924	Jan. 30, 1926	Burr, S. L., Co.
Broilers . . .	210	Nov. 6, 1924	Feb. 6, 1926	Burr, S. L., Co.
Broilers . . .	1,530	Oct. 1, 1924	Jan. 1, 1926	Childs, Sleeper & Co.
Broilers . . .	503	Oct. 4, 1924	Jan. 4, 1926	Childs, Sleeper & Co.
Broilers . . .	432	Oct. 7, 1924	Jan. 7, 1926	Childs, Sleeper & Co.
Broilers . . .	530	Oct. 7, 1924	Jan. 7, 1926	Childs, Sleeper & Co.
Broilers . . .	514	Oct. 15, 1924	Jan. 15, 1926	Childs, Sleeper & Co.
Broilers . . .	1,604	Oct. 16, 1924	Jan. 16, 1926	Childs, Sleeper & Co.
Broilers . . .	1,848	Sept. 19, 1924	Dec. 1, 1925	Kimball, J. F., & Co., Inc.
Chickens . . .	454	Sept. 27, 1924	Dec. 27, 1925	Berman & Co., Inc.
Chickens . . .	1,216	Sept. 27, 1924	Dec. 27, 1925	Berman & Co., Inc.
Chickens . . .	1,025	Oct. 18, 1924	Jan. 1, 1926	Berman & Co., Inc.
Chickens . . .	443	Oct. 25, 1924	Jan. 1, 1926	Berman & Co., Inc.
Chickens . . .	699	Nov. 5, 1924	Jan. 1, 1926	Berman & Co., Inc.
Chickens . . .	1,220	Oct. 8, 1924	Jan. 8, 1926	Childs, Sleeper & Co.
Chickens . . .	1,426	Oct. 8, 1924	Jan. 8, 1926	Childs, Sleeper & Co.
Chickens . . .	1,530	Oct. 11, 1924	Jan. 11, 1926	Childs, Sleeper & Co.
Chickens . . .	1,834	Oct. 25, 1924	Jan. 25, 1926	Childs, Sleeper & Co.
Chickens . . .	1,900	Oct. 17, 1924	Dec. 17, 1925	Lamson & Co.
Chickens . . .	2,026	Oct. 17, 1924	Dec. 17, 1925	Lamson & Co.
Chickens . . .	1,595	Oct. 20, 1924	Dec. 19, 1925	Lamson & Co.
Chickens . . .	1,414	Nov. 4, 1924	Feb. 4, 1926	Lamson & Co.
Chickens . . .	1,652	Nov. 4, 1924	Feb. 4, 1926	Lamson & Co.
Chickens . . .	550	Nov. 5, 1924	Feb. 5, 1926	Lamson & Co.
Chickens . . .	1,258	Nov. 10, 1924	Feb. 10, 1926	Lamson & Co.
Chickens . . .	2,134	Nov. 10, 1924	Feb. 10, 1926	Lamson & Co.
Chickens . . .	3,514	Nov. 11, 1924	Feb. 11, 1926	Lamson & Co.
Chickens . . .	2,250	Nov. 15, 1924	Feb. 15, 1926	Lamson & Co.
Chickens . . .	2,495	Nov. 15, 1924	Feb. 15, 1926	Lamson & Co.
Chickens . . .	3,892	Nov. 15, 1924	Feb. 15, 1926	Lamson & Co.
Chickens . . .	1,188	Nov. 22, 1924	Feb. 22, 1926	Lamson & Co.
Chickens . . .	2,495	Nov. 22, 1924	Feb. 22, 1926	Lamson & Co.
Chickens . . .	943	Nov. 24, 1924	Dec. 24, 1925	Lamson & Co.
Chickens . . .	1,075	Nov. 24, 1924	Dec. 24, 1925	Lamson & Co.
Chickens . . .	2,730	Nov. 24, 1924	Dec. 24, 1925	Lamson & Co.
Chickens . . .	113	Nov. 26, 1924	Feb. 26, 1926	Lamson & Co.
Chickens . . .	1,685	Nov. 26, 1924	Feb. 26, 1926	Lamson & Co.
Chickens . . .	840	Nov. 28, 1924	Feb. 28, 1926	Lamson & Co.
Chickens . . .	920	Nov. 28, 1924	Feb. 28, 1926	Lamson & Co.
Chickens . . .	1,316	Nov. 28, 1924	Feb. 22, 1926	Lamson & Co.
Chickens . . .	1,978	Nov. 28, 1924	Feb. 26, 1926	Lamson & Co.
Chickens . . .	1,519	Nov. 29, 1924	Feb. 28, 1926	Lamson & Co.
Chickens . . .	1,860	Nov. 29, 1924	Dec. 29, 1925	Lamson & Co.
Chickens . . .	2,613	Nov. 29, 1924	Feb. 28, 1926	Lamson & Co.
Chickens . . .	3,716	Nov. 29, 1924	Feb. 28, 1926	Lamson & Co.
Chickens . . .	720	Nov. 14, 1924	Jan. 14, 1926	Lawrence, H. L., Co.
Chickens . . .	1,480	Nov. 18, 1924	Jan. 18, 1926	Lawrence, H. L., Co.
Chickens . . .	245	Nov. 13, 1924	Mar. 13, 1926	Poole, J. R., Co.
Chickens . . .	479	Nov. 13, 1924	Mar. 4, 1926	Poole, J. R., Co.
Chickens . . .	500	Nov. 13, 1924	Mar. 13, 1926	Poole, J. R., Co.
Chickens . . .	1,274	Nov. 13, 1924	Mar. 4, 1926	Poole, J. R., Co.
Chickens . . .	1,480	Nov. 13, 1924	Mar. 13, 1926	Poole, J. R., Co.
Chickens . . .	1,540	Nov. 13, 1924	Mar. 4, 1926	Poole, J. R., Co.
Chickens . . .	1,719	Nov. 13, 1924	Mar. 4, 1926	Poole, J. R., Co.
Chickens . . .	2,421	Nov. 13, 1924	Mar. 13, 1926	Poole, J. R., Co.
Chickens . . .	4,472	Nov. 21, 1924	Jan. 21, 1926	Wheeler, T. H., Co.
Chickens . . .	12,000	Nov. 21, 1924	Jan. 29, 1926	Wheeler, T. H., Co.
Chickens . . .	3,500	Nov. 29, 1924	Jan. 29, 1926	Wheeler, T. H., Co.
Ducks . . .	495	Nov. 22, 1924	Dec. 22, 1925	Lamson & Co.
Ducks . . .	1,220	Nov. 22, 1924	Feb. 22, 1926	Lamson & Co.
Fowls . . .	1,012	Jan. 7, 1924	Mar. 7, 1925	Eastman, Frank B.
Geese . . .	582	Dec. 31, 1924	Mar. 31, 1925	Eastman, Frank B.
Geese . . .	1,866	Nov. 22, 1924	Feb. 22, 1926	Lamson & Co.
Geese . . .	5,820	Nov. 22, 1924	Dec. 22, 1925	Lamson & Co.
Geese . . .	6,826	Nov. 22, 1924	Feb. 22, 1926	Lamson & Co.
Geese . . .	1,841	Nov. 26, 1924	Dec. 26, 1925	Lamson & Co.
Geese . . .	725	Nov. 29, 1924	Feb. 28, 1926	Lamson & Co.
Roosters . . .	12,812	June 27, 1924	Sept. 21, 1925	Fairmont Creamery Co.
Roosters . . .	19,513	June 28, 1924	Sept. 1, 1925	Lamson & Co.
Roosters . . .	7,128	July 3, 1924	Aug. 3, 1925	Lamson & Co.
Roosters . . .	471	July 8, 1924	Aug. 8, 1925	Lamson & Co.
Roosters . . .	3,550	July 14, 1924	Aug. 14, 1925	Lamson & Co.
Turkeys . . .	1,709	Jan. 25, 1924	Feb. 25, 1925	Dorr, Arthur E., & Co., Inc.
Turkeys . . .	4,911	Jan. 25, 1924	Feb. 25, 1925	Dorr, Arthur E., & Co., Inc.
Turkeys . . .	1,298	Nov. 26, 1924	Dec. 26, 1925	Lamson & Co.
Turkeys . . .	400	Nov. 26, 1924	Dec. 26, 1925	Parker, Charles W.
Miscel. poultry . . .	1,658	Oct. 22, 1924	Dec. 21, 1925	Lamson & Co.
Miscel. poultry . . .	767	Nov. 22, 1924	Feb. 22, 1926	Lamson & Co.
Deer . . .	70	Nov. 5, 1924	Feb. 1, 1926	Davis, Fred E.
Venison . . .	15	Nov. 11, 1924	Dec. 31, 1925	Gregonvaux, M. G.
Beef . . .	765	June 23, 1924	Aug. 23, 1925	Skinner, George E., Co.
Beef hearts . . .	289	Apr. 4, 1924	Aug. 1, 1925	Hodder, W. W., Co.

TABLE 7. — *Requests for Extension of Time granted on Goods in Cold Storage from December 1, 1924, to December 1, 1925 — Continued.*

ARTICLE.	Weight (Pounds).	Placed in Storage.	Extension granted to —	Name.
Beef kidneys	90	May 21, 1924	Aug. 1, 1925	Hodder, W. W., Co.
Beef loins	10,270	Feb. 14, 1924	July 15, 1925	Doe, William A., Co.
Beef loins	12,090	Mar. 14, 1924	Aug. 15, 1925	Doe, William A., Co.
Beef loins	2,846	June 12, 1924	Aug. 12, 1925	Dorr, Arthur E., & Co., Inc.
Beef loins	9,850	June 26, 1924	Aug. 26, 1925	Dorr, Arthur E., & Co., Inc.
Beef loins	2,236	Apr. 28, 1924	July 27, 1925	Hollis, N. E., Co.
Beef loins	3,632	May 6, 1924	Aug. 6, 1925	Hollis, N. E., Co.
Beef loins	2,949	May 24, 1924	Aug. 24, 1925	Hollis, N. E., Co.
Beef loins	1,007	June 16, 1924	Aug. 16, 1925	Skinner, George E., Co.
Beef loins	748	June 25, 1924	Aug. 25, 1925	Skinner, George E., Co.
Beef loins	1,255	June 25, 1924	Aug. 25, 1925	Skinner, George E., Co.
Beef loins	900	June 19, 1924	Sept. 15, 1925	Swift & Co.
Beef loins	3,671	June 20, 1924	Sept. 15, 1925	Swift & Co.
Beef loins	1,520	June 21, 1924	Sept. 15, 1925	Swift & Co.
Beef loins	5,686	June 21, 1924	Sept. 15, 1925	Swift & Co.
Beef ribs	3,250	Feb. 9, 1924	July 15, 1925	Doe, William A., Co.
Beef ribs	1,542	Feb. 12, 1924	July 15, 1925	Doe, William A., Co.
Beef ribs	5,168	Feb. 14, 1924	July 15, 1925	Doe, William A., Co.
Beef ribs	5,036	Feb. 29, 1924	Apr. 29, 1925	Doe, William A., Co.
Beef ribs	958	Apr. 28, 1924	July 27, 1925	Hollis, N. E., Co.
Beef ribs	1,596	May 6, 1924	Aug. 6, 1925	Hollis, N. E., Co.
Beef ribs	1,113	May 13, 1924	Aug. 13, 1925	Hollis, N. E., Co.
Beef ribs	1,225	May 26, 1924	Aug. 26, 1925	Hollis, N. E., Co.
Beef rounds	1,618	Jan. 10, 1924	Feb. 10, 1925	Wattendorf, F. M., & Co.
Beef strips	429	June 20, 1924	Sept. 15, 1925	Swift & Co.
Beef strips	477	June 24, 1924	Sept. 15, 1925	Swift & Co.
Beef strips	257	June 27, 1924	Sept. 15, 1925	Swift & Co.
Beef strips	433	June 27, 1924	Sept. 15, 1925	Swift & Co.
Beef tenderloins	1,044	—	July 1, 1925	Skinner, George E., Co.
Beef tenderloins	—	July 1924	Oct. 1, 1925	Swift & Co.
Beef tenderloins	—	July 1924	Oct. 1, 1925	Swift & Co.
Beef tenderloins	—	July 1924	Oct. 1, 1925	Swift & Co.
Pork	18,000	July 5, 1924	Sept. 5, 1925	Hinckley, H. P.
Pork	15,236	Jan. 23, 1924	Feb. 23, 1925	Humphrey, J. L., Jr.
Pork	14,280	Jan. 25, 1924	Feb. 25, 1925	Humphrey, J. L., Jr.
Pork	2,451	Jan. 28, 1924	Feb. 28, 1925	Humphrey, J. L., Jr.
Pork loins	3,715	Dec. 24, 1923	Jan. 24, 1925	Chamberlain & Co., Inc.
Pork loins	2,010	Jan. 31, 1924	Mar. 2, 1925	Krey Packing Co.
Pork loins	2,545	Jan. 31, 1924	Mar. 2, 1925	Krey Packing Co.
Pork loins	14,690	Jan. 31, 1924	Mar. 2, 1925	Krey Packing Co.
Pork loins	19,137	Feb. 1, 1924	Mar. 1, 1925	Krey Packing Co.
Pork loins	4,597	Feb. 13, 1924	Apr. 13, 1925	Skinner, George E., Co.
Pork loins	800	June 20, 1924	July 20, 1925	Wattendorf & Feeney Co.
Pork loins	16,000	July 8, 1924	Aug. 8, 1925	Wheeler, T. H., Co.
Pork loins	22,298	Dec. 23, 1924	Jan. 24, 1925	Wheeler, T. H., Co.
Pork loins	20,500	Dec. 28, 1923	Jan. 28, 1925	Wilson & Co.
Sweetbreads	378	Aug. 6, 1924	Oct. 6, 1925	Armour & Co.
Veal legs	3,066	Feb. 27, 1924	Mar. 27, 1925	Dorr, Arthur E., & Co., Inc.
Butterfish	696	Jan. 14, 1924	Oct. 14, 1925	Rowe & Sullivan
Cod	2,320	Aug. 7, 1924	Oct. 7, 1925	Atlantic & Pacific Fish Co.
Cod	1,430	Sept. 12, 1924	Dec. 12, 1925	Fulham & Herbert
Devil fish	3,300	Dec. 10, 1924 ²	Dec. 10, 1925	Mantia, S., Co.
Eels, sand	999	July 25, 1924	Dec. 25, 1925	Zizzo, F., & L.
Flounders	—	Sept. 19, 1924	Dec. 19, 1925	Russo & Sons.
Flounders	600	Sept. 19, 1924	Dec. 19, 1925	Russo & Sons.
Halibut	6,000	Sept. 7, 1924	Dec. 7, 1925	Atlantic Halibut Co.
Halibut	9,000	Sept. 7, 1924	Dec. 7, 1925	Atlantic Halibut Co.
Halibut	6,600	Oct. 8, 1924	Jan. 8, 1926	Atlantic Halibut Co.
Halibut	520	Aug. 15, 1924	Oct. 15, 1925	Atlantic & Pacific Fish Co.
Halibut	450	Oct. 1, 1924	Jan. 1, 1926	Cape Fish Co.
Halibut	680	July 2, 1924	Nov. 2, 1925	Dorr, Arthur E., & Co., Inc.
Halibut	3,996	Aug. 15, 1924	Nov. 15, 1925	Dorr, Arthur E., & Co., Inc.
Halibut	2,600	Sept. 20, 1924	Dec. 20, 1925	Dorr, Arthur E., & Co., Inc.
Halibut	300	Oct. 6, 1924	Dec. 31, 1925	Dorr, Arthur E., & Co., Inc.
Halibut	1,155	Jan. 6, 1924	Mar. 6, 1925	Folsom, Benjamin F.
Halibut	350	Oct. 15, 1924	Dec. 15, 1925	Freeman & Cobb Co.
Halibut	300	Oct. 1, 1924	Dec. 31, 1925	Goodspeed, L. B., Co.
Halibut	16,250	Feb. 25, 1924	Mar. 25, 1925	New England Fish Co.
Halibut	53,009	Feb. 25, 1924	Mar. 25, 1925	New England Fish Co.
Halibut	22,397	Oct. 15, 1924	Jan. 13, 1926	New England Fish Co.
Halibut	23,410	Oct. 16, 1924	Jan. 16, 1926	New England Fish Co.
Halibut	24,193	Oct. 16, 1924	Jan. 2, 1926	New England Fish Co.
Halibut	7,800	Oct. 20, 1924	Feb. 20, 1926	New England Fish Co.
Halibut	122,048	Oct. 25, 1924	Feb. 15, 1926	New England Fish Co.
Halibut	30,478	Oct. 28, 1924	Feb. 28, 1926	New England Fish Co.
Halibut	60,809	Nov. 1, 1924	Mar. 1, 1926	New England Fish Co.
Halibut	3,618	Sept. 5, 1924	Dec. 5, 1925	Whitman, Ward & Lee Co.
Halibut	430	Sept. 11, 1924	Dec. 11, 1925	Whitman, Ward & Lee Co.
Herring, sardine	7,500	Dec. 8, 1923	Feb. 28, 1925	Busalacchi Brothers,
Herring, sardine	7,920	Nov. 10, 1924	Feb. 10, 1926	Booth Fisheries Co.
Herring, sardine	1,196	Nov. 21, 1924	Feb. 21, 1926	Booth Fisheries Co.
Herring, sardine	145	Nov. 22, 1924	Feb. 22, 1926	Booth Fisheries Co.

¹ Date of deposit unknown.² Received frozen and undated.

TABLE 7. — *Requests for Extension of Time granted on Goods in Cold Storage from December 1, 1924, to December 1, 1925 — Concluded.*

ARTICLE.	Weight (Pounds).	Placed in Storage.	Extension granted to —	Name.
Herring, sardine ¹	7,800	Dec. 1, 1924 ²	Mar. 30, 1926	Cefalu, Joseph.
Herring, sardine ¹	10,000	Dec. 15, 1924 ²	Mar. 30, 1926	Cefalu, Joseph.
Herring	200	Feb. 2, 1925 ²	Dec. 2, 1925	Price Fish Co.
Mackerel	625	July 9, 1924	Nov. 30, 1925	Baker, A. G., Inc.
Mackerel	7,033	July 19, 1924	Oct. 19, 1925	Batchelder & Snyder Co.
Mackerel	1,275	June 8, 1924	Dec. 8, 1925	Dorr, Arthur E., & Co., Inc.
Mackerel	1,530	July 25, 1924	Oct. 25, 1925	Foley, M. F., Co.
Mackerel	1,869	July 18, 1924	Nov. 5, 1925	Folsom, Benjamin F.
Mackerel	3,600	July 8, 1924	Nov. 1, 1925	Goodspeed, L. B., & Co.
Mackerel	540	Sept. 13, 1924	Dec. 13, 1925	Goodspeed, L. B., & Co.
Mackerel	2,156	Sept. 25, 1924	Dec. 25, 1925	Goodspeed, L. B., & Co.
Mackerel	600	Feb. 2, 1925 ²	Dec. 23, 1925	Goodspeed, L. B., & Co.
Mackerel	500	Aug. 9, 1924	Dec. 9, 1925	Kromer, H.
Mackerel	3,671	July 12, 1924	Oct. 29, 1925	Nagle, John, & Co.
Mackerel	290	Aug. 26, 1924	Nov. 26, 1925	Neal, John R., Co.
Mackerel	714	Aug. 26, 1924	Nov. 26, 1925	Neal, John R., Co.
Mackerel	13,600	Sept. 25, 1924	Dec. 26, 1925	O'Hara Brothers Co., Inc.
Mackerel	120	July 31, 1924	Dec. 31, 1925	Tocco, Joseph.
Mackerel	720	Apr. 12, 1924	Dec. 12, 1925	Whitman, Ward & Lee Co.
Salmon	836	Apr. 29, 1925 ²	Jan. 28, 1926	Adams, J., & Co., Inc.
Salmon	4,000	Feb. 18, 1924	Mar. 18, 1925	Arnold & Winsor Co.
Salmon	3,600	Oct. 12, 1924	Jan. 12, 1926	Arnold & Winsor Co.
Salmon	638	Oct. 27, 1924	Dec. 27, 1925	Arrington, Harold R.
Salmon	380	Nov. 21, 1924	Dec. 10, 1925	Atlantic & Pacific Fish Co.
Salmon	1,550	July 10, 1924	Dec. 19, 1925	Atwood & Co.
Salmon	2,375	July 10, 1924	Dec. 19, 1925	Atwood & Co.
Salmon	3,750	Sept. 15, 1924	Dec. 15, 1925	Batchelder & Snyder Co.
Salmon	2,500	Oct. 24, 1924	Dec. 1, 1925	Batchelder & Snyder Co.
Salmon	743	Sept. 10, 1924	Dec. 10, 1925	Burns & McKeon Co.
Salmon	535	Sept. 10, 1924	Dec. 20, 1925	Dorr, Arthur E., & Co., Inc.
Salmon	1,825	July 10, 1924	Oct. 10, 1925	Foley, M. F., Co.
Salmon	1,300	Nov. 4, 1924	Feb. 4, 1926	Foley, M. F., Co.
Salmon	500	Oct. 24, 1924	Dec. 24, 1925	Harding, F. E.
Salmon	525	Apr. 29, 1925 ²	Jan. 29, 1926	Henry & Close.
Salmon	68,200	Nov. 10, 1924	Feb. 10, 1926	New England Fish Co.
Salmon	15,810	Sept. 10, 1924	Dec. 10, 1925	O'Hara Brothers Co., Inc.
Salmon	27,450	Oct. 10, 1924	Jan. 10, 1926	O'Hara Brothers Co., Inc.
Salmon	2,800	Feb. 18, 1924	Mar. 18, 1925	Prior, P. H., Co.
Salmon	350	Apr. 29, 1925 ²	Dec. 31, 1925	Russo & Sons.
Salmon	500	Sept. 10, 1924	Dec. 10, 1925	Whitman, Ward & Lee Co.
Salmon	5,744	Sept. 10, 1924	Dec. 10, 1925	Whitman, Ward & Lee Co.
Shrimps	30	Nov. 23, 1924	Dec. 20, 1925	Corso & Cannizzo.
Shrimps	1,175	Nov. 28, 1924	Dec. 20, 1925	Corso & Cannizzo.
Shrimps	150	Sept. 12, 1924	Nov. 12, 1925	Russo & Sons.
Shrimps	750	Oct. 14, 1924	Dec. 20, 1925	Russo & Sons.
Shrimps	4,953	Nov. 28, 1924	Jan. 9, 1926	Russo & Sons.
Smelts	250	Jan. 5, 1925 ²	Dec. 5, 1925	Cape Fish Co.
Smelts	450	Mar. 28, 1925	Dec. 20, 1925	Corso Brothers.
Smelts	312	Feb. 27, 1925	Nov. 27, 1925	Foley, M. F., Co.
Smelts	350	—	Dec. 31, 1925	Russo & Sons.
Smelts	1,464	Dec. 29, 1924 ²	Dec. 29, 1925	Russo & Sons.
Smelts	1,957	Dec. 29, 1924 ²	Dec. 29, 1925	Russo & Sons.
Smelts	2,300	Jan. 5, 1925 ²	Dec. 22, 1925	Russo & Sons.
Smelts	1,000	Jan. 8, 1925 ²	Dec. 22, 1925	Russo & Sons.
Smelts	2,349	Jan. 12, 1925 ²	Dec. 22, 1925	Russo & Sons.
Smelts	140	Jan. 5, 1925 ²	Dec. 31, 1925	Tocco, Joseph.
Smelts	529	Jan. 5, 1925 ²	Dec. 31, 1925	Tocco, Joseph.
Smelts	440	Jan. 19, 1925 ²	Dec. 31, 1925	Tocco, Joseph.
Smelts	1,513	June 2, 1925 ²	Dec. 31, 1925	Tocco, Joseph.

TABLE 8. — *Requests for Extension of Time not granted on Goods in Cold Storage from December 1, 1924, to December 1, 1925.*

ARTICLE.	Weight (Pounds).	Placed in Storage.	Name.
Butter	3,100	June 9, 1924	Goldsmith, Stockwell Co.
Butter	8,906	June 9, 1924	Goldsmith, Stockwell Co.
Butter	62	June 10, 1924	Ligein, Fernand C.
Broilers	161	Sept. 13, 1924	Berman & Co., Inc.
Broilers	467	Oct. 4, 1924	Childs, Sleeper & Co.
Chickens	1,214	Oct. 30, 1924	Lamson & Co.
Fowl	252	Nov. 18, 1924	Eastman, Frank B.
Geese	769	Nov. 13, 1924	Eastman, Frank B.
Roosters	10,353	July 28, 1924	Lamson & Co.
Roosters	16,990	Aug. 9, 1924	Lamson & Co.
Oxtails	1,100	June 11, 1924	Sears, Alfred, Co.
Pork	6,494	Dec. 20, 1923	Poole, J. R., Co.
Pork	13,858	Dec. 20, 1923	Poole, J. R., Co.
Pork	5,348	Dec. 24, 1923	Poole, J. R., Co.
Pork	19,073	Dec. 24, 1923	Poole, J. R., Co.
Pork	11,520	Dec. 26, 1923	Rounsevell, P. W.
Halibut	250	Aug. 10, 1924	Baker, A. G., Inc.
Mackerel	175	June 14, 1924	Farney, John T., & Son.
Mackerel	1,900	July 9, 1924	Phillips, B. F., & Co.

¹ Bait.² Received frozen and undated.

TABLE 9. — *Articles which had been in Cold Storage Longer than Twelve Months, and on which no Requests for Extensions had been made, ordered removed from December 1, 1924, to December 1, 1925.*

ARTICLE.	Weight (Pounds).	Placed in Storage.	Name.
Egg yolks	—	Apr. 1924	Fairmont Creamery Co.
Butter	120	May 31, 1924	Hood Rubber Co.
Butter	1,800	July 25, 1924	Howard, J. E.
Broilers	51	Oct. 24, 1924	Alley, Green & Pipe.
Broilers	255	Sept. 8, 1924	Armour & Co.
Broilers	234	Sept. 11, 1924	Armour & Co.
Broilers	137	Sept. 3, 1924	Childs, Sleeper Co.
Broilers	97	Aug. 11, 1924	Gordon, Walter.
Broilers	775	Aug. 20, 1924	Rozen, A.
Chickens	2,212	Nov. 8, 1924	Batchelder & Snyder Co.
Chickens	804	Nov. 6, 1924	Doe, William A., Co.
Chickens	1,400	Oct. 30, 1924	Rozen, A.
Chickens	116	June 18, 1924	Smith, H. W.
Ducks	271	Dec. 1, 1923	Court Restaurant.
Ducks	60	Apr. 23, 1924	Strong, Marson Co.
Fowl	127	Nov. 16, 1923	Armour & Co.
Fowl	80	Sept. 15, 1923	Berry-Wales Co.
Fowl	84	Oct. 30, 1924	Childs, Sleeper & Co.
Fowl	176	Dec. 12, 1923	Saunders Market.
Fowl	107	Nov. 27, 1923	Strong, Marson Co.
Geese	349	Nov. 28, 1923	Slayton & Boynton Co.
Roasters	360	Sept. 5, 1924	Quinn, P. F.
Bear	39	Oct. 22, 1924	Batchelder & Snyder Co.
Bear	39	Oct. 22, 1924	Batchelder & Snyder Co.
Bear	104	Oct. 24, 1924	Batchelder & Snyder Co.
Bear	47	Oct. 28, 1924	Batchelder & Snyder Co.
Deer	—	Nov. 8, 1923	Brightman, Theodore G.
Moose meat	95	Oct. 14, 1924	Batchelder & Snyder Co.
Venison	43	Dec. 1, 1923	Gove, Oscar T.
Venison	60	Dec. 15, 1923	Greenman, Charles, Jr.
Venison	75	Nov. 21, 1923	Leith, F.
Venison	20	Dec. 11, 1923	Longridge, F. L.
Beef	180	Jan. 4, 1924	Marble, A. B.
Beef	210	Aug. 8, 1924	Childs, Sleeper Co.
Beef butts	882	June 28, 1924	Childs, Sleeper Co.
Beef cuts	170	Nov. 24, 1923	McDonald, W. M.
Beef hips	930	Nov. 3, 1923	Willis, C. H.
Beef livers	—	Nov. 12, 1923	Black, James.
Beef ribs	312	Apr. 18, 1924	Lipsky, Louis, Jr.
Beef ribs	313	Apr. 12, 1924	Lipsky, Louis, Jr.
Beef rounds	80	July 31, 1924	Hodder, W. W.
Beef strips	978	July 30, 1924	Childs, Sleeper Co.
Beef tenderloins	63	Dec. 6, 1923	Kurland, A.
Beef tenderloins	149	July 25, 1924	Kurland Brothers.
Pork	300	Sept. 6, 1924	Page Brothers.
Pork loins	5,335	Feb. 13, 1924	Benson Brothers.
Veal legs	160	July 26, 1924	Hodder, W. W.
Sweetbreads	3	June 20, 1924	Berry-Wales Co.
Halibut	200	Aug. 12, 1924	Baker, A. G., Inc.
Halibut	85	Mar. 1, 1924	Batchelder & Snyder Co.
Halibut	170	Oct. 24, 1924	Cape Fish Co.
Mackerel	283	Sept. 25, 1923	Calnan, Edward C.
Mackerel	130	Sept. 9, 1924	Tocco, Joseph.
Salmon	1,750	Oct. 25, 1924	Burns-McKeon Co.
Salmon	250	Oct. 24, 1924	Fairburn's Market.
Salmon	401	Oct. 31, 1924	Neal, J. R., Co.
Squid	175	May 17, 1924	Catanese, J.
Squid	350	May 19, 1924	Guiffre, Frank.
Miscellaneous fish	125	Dec. 28, 1923	Pazol, B.

TABLE 10. — *Articles Other than Fish placed in Cold Storage from December 1, 1924, to December 1, 1925.*

	Butter (Pounds).	Eggs (Dozens).	Broken- out Eggs (Pounds).	Broilers (Pounds).	Roasters (Pounds).	Fowls (Pounds).	Turkeys (Pounds).	Miscel- laneous Poultry (Pounds).	Beef (Pounds).	Pork (Pounds).	Lamb and Mutton (Pounds).	Miscel- laneous Meats (Pounds).
December	1,024,522	357,660	230,156	60,499	2,038,900	835,235	2,509,110	1,243,327	1,230,335	4,098,157	71,646	1,712,062
January	1,029,600	256,080	448,210	54,891	693,392	362,845	705,824	424,080	323,146	6,300,123	48,242	1,338,042
February	570,933	177,300	199,108	40,777	391,188	310,086	47,756	151,122	534,448	3,160,713	50,234	705,282
March	501,182	1,729,470	327,162	37,808	210,387	212,310	71,280	151,656	508,618	2,223,600	77,280	654,276
April	465,556	6,205,710	539,632	23,507	179,351	68,880	38,880	81,224	542,284	1,642,378	138,908	732,970
May	988,263	5,321,280	30,272	301,490	301,490	181,540	38,699	205,318	511,902	1,585,617	21,397	638,531
June	7,197,449	2,621,310	1,067,009	89,996	313,140	375,601	22,710	230,987	520,929	2,671,048	75,674	1,124,446
July	8,607,549	1,530,350	753,092	140,086	110,902	372,454	45,968	238,862	487,757	2,621,508	109,568	749,519
August	4,801,590	1,102,800	790,444	84,490	71,608	201,683	10,488	179,151	179,777	1,219,583	74,857	623,725
September	2,896,380	684,480	259,746	133,159	126,956	54,562	35,487	123,013	308,020	1,219,657	54,319	871,599
October	1,744,046	576,960	656,775	181,076	614,575	110,822	22,597	171,460	401,519	1,338,146	122,544	638,915
November	1,008,034	375,240	236,403	122,776	1,152,028	356,266	299,848	212,546	1,272,635	513,892	51,508	1,153,771

TABLE 11. — *Fish placed in Cold Storage from December 15, 1924, to December 15, 1925.*

	Bluefish (Pounds).	Butter- fish (Pounds).	Ciscoes (Pounds).	Cod, Hake, Pollock and Haddock (Pounds).	Halibut (Pounds).	Herring (Pounds).	Mackerel (Pounds).	Fall and Silver Salmon (Pounds).	Salmon, all Other (Pounds).	Shad (Pounds).	Smelts, Eulach- on, etc. (Pounds).	Squid (Pounds).	Whitefish (Pounds).	Whiting (Pounds).	Miscel- laneous Frozen Fish (Pounds).
December	-	3,405	100,977	36,554	366,154	554,465	161,260	62,587	40,645	-	110,582	208,362	4,741	485	90,905
January	-	23,796	49,080	20,523	304,855	476,209	116,390	144,112	30,000	1,684	19,530	170,522	-	-	58,984
February	-	-	-	47,050	390,166	390,166	92,754	5,000	120,800	9,866	34,607	300,264	-	25,437	51,138
March	-	2,756	700	84,562	252,031	65,550	35,325	8,112	120,800	10,768	105,274	21,802	-	-	21,802
April	2,700	661	-	79,901	338,275	372,877	1,093,033	64,785	40,276	52,596	6,162	443,238	1,000	4,225	970,897
May	200	48,636	-	24,979	38,187	340,694	1,163	70,494	1,163	21,879	905	1,138,368	1,000	634,601	332,378
June	1,143	66,742	1,400	31,430	18,748	302,740	4,321,148	2,066	139,046	815	285	136,411	200	3,431,087	252,652
July	300	2,310	6,700	83,780	42,449	1,794,598	11,620	10,857	18,082	-	1,115	219,394	-	2,103,458	284,890
August	995	14,740	2,760	196,436	52,887	185,783	1,705,624	41,524	18,082	-	3,290	255,662	120	122,286	117,297
September	1,661	15,082	12,956	149,550	12,590	477,932	749,104	18,459	8,290	133	115	365,700	-	55,555	381,836
October	50	825	1,120	245,085	170,286	773,102	204,013	98,436	4,759	600	37,639	132,095	-	139,961	131,795
November	300	18,521	3,475	88,750	62,280	379,052	92,691	115,718	23,088	2,250	11,892	250,702	15,539	17,350	193,120

TABLE 12. — *Articles Other than Fish on Hand in Cold Storage on the First Day of the Month, from January 1, 1924, through December 1, 1925.*

	Butter (Pounds).	Eggs (Dozens).	Broken- out Eggs (Pounds).	Broilers (Pounds).	Roasters (Pounds).	Fowls (Pounds).	Turkeys (Pounds).	Miscel- laneous Poultry (Pounds).	Beef (Pounds).	Pork (Pounds).	Lamb and Mutton (Pounds).	Miscel- laneous Meats (Pounds).
January	11,508,537	3,110,790	633,728	1,124,388	4,018,858	1,679,885	2,466,425	2,168,534	2,851,270	5,325,130	598,627	2,942,011
February	7,779,956	448,890	570,415	1,089,812	4,393,032	1,677,628	2,724,747	2,347,832	2,443,885	10,091,592	437,415	2,951,681
March	5,175,881	15,750	272,848	1,018,612	4,475,343	1,717,270	2,568,261	2,311,990	2,534,406	12,296,431	387,382	2,866,981
April	2,335,244	1,618,920	357,470	907,501	4,043,496	1,131,034	2,271,956	2,105,732	2,548,326	11,473,309	355,025	2,569,428
May	431,324	6,763,310	692,566	766,327	3,453,773	594,743	1,943,773	1,755,674	2,451,717	10,250,964	415,716	2,694,914
June	760,404	12,573,840	1,294,635	691,736	3,190,148	399,383	1,761,606	1,628,074	2,013,970	9,110,084	319,552	2,446,073
July	7,228,058	14,543,820	2,125,245	545,336	2,754,940	413,980	1,573,468	1,582,561	1,909,555	9,786,174	286,593	2,818,745
August	14,572,162	14,971,110	2,514,614	531,174	2,173,270	554,679	1,373,786	1,523,808	1,121,035	8,400,581	254,545	2,628,694
September	17,628,728	14,380,710	2,817,750	506,235	1,384,027	485,678	1,142,489	1,383,182	521,862	6,660,361	283,106	2,055,155
October	17,308,401	12,803,160	2,688,425	562,843	1,016,281	180,938	908,258	1,293,395	331,330	4,198,320	356,456	1,843,413
November	14,384,523	10,085,400	2,767,488	657,105	1,290,780	147,328	658,672	1,234,625	459,142	1,293,465	338,600	1,377,611
December	12,268,936	7,121,970	2,239,197	733,425	2,245,857	417,568	359,997	1,210,164	1,490,040	317,949		1,662,368

TABLE 13. — *Fish on Hand in Cold Storage on the Fifteenth Day of the Month, from January 15, 1924, through December 15, 1925.*

	Bluefish (Pounds).	Butter- fish (Pounds).	Ciscoes (Pounds).	Cod, Hake, Pollock and Haddock (Pounds).	Halibut (Pounds).	Herring (Pounds).	Mackerel (Pounds).	Fall and Silver Salmon (Pounds).	Salmon, all Other (Pounds).	Shad (Pounds).	Smelts, Eula- chon, etc. (Pounds).	Squid (Pounds).	Whitefish (Pounds).	Whiting (Pounds).	Miscel- laneous Frozen Fish (Pounds).
January	-	13,245	74,982	216,226	825,436	2,089,398	1,624,422	394,228	217,044	44,296	112,267	1,050,575	4,490	1,050,615	687,184
February	-	28,520	54,908	96,151	686,146	1,729,619	1,162,762	408,605	186,222	40,608	87,389	867,097	2,336	562,341	418,806
March	-	9,136	14,816	81,416	273,913	1,127,217	603,110	231,540	159,341	19,128	68,764	546,769	596	84,788	164,784
April	-	2,869	3,223	79,797	390,884	211,404	168,284	84,192	227,299	9,165	136,664	75,400	31	7,642	103,142
May	-	1,232	200	59,927	671,092	258,192	1,046,334	67,662	206,485	21,086	133,002	495,215	31	10,596	329,844
June	-	44,177	200	62,237	683,912	439,683	1,046,334	67,662	206,485	21,086	133,002	495,215	131	650,372	534,181
July	1,070	110,892	200	67,771	682,739	618,059	1,353,016	52,609	239,428	30,633	126,015	1,697,691	331	3,978,910	705,672
August	1,265	108,483	1,100	133,806	685,102	500,520	2,944,494	51,029	202,955	25,511	126,015	1,795,864	331	5,900,562	898,569
September	2,295	117,315	900	315,352	693,829	527,169	4,633,507	62,263	202,325	20,378	127,878	1,751,462	251	5,838,379	900,069
October	3,796	132,357	7,675	438,091	686,899	712,887	5,142,309	58,693	178,620	17,511	122,270	1,804,671	251	5,505,143	1,004,961
November	3,073	122,586	1,035	597,167	725,104	997,939	4,373,615	128,045	160,483	16,111	144,289	1,575,254	220	5,073,586	1,130,626
December	2,392	110,521	2,540	409,871	424,930	1,094,767	2,815,629	158,191	94,576	17,382	115,788	1,182,372	15,008	4,254,156	1,005,239

Summary.

Requests for extension of time granted	234
Butter	1
Poultry	88
Game	2
Meat	50
Fish	93
Requests for extension of time not granted	19
Butter	3
Broilers	7
Meat	6
Fish	3
Articles ordered removed from storage (no requests made)	59
Eggs	1
Butter	2
Poultry	19
Game	11
Meat	15
Fish	11

REPORT OF DIVISION OF COMMUNICABLE DISEASES.

WOLFERT G. WEBBER, M.D., *Acting Director.*

OUTLINE.

- I. General remarks.
- II. Changes in Personnel.
- III. Activities of District Health Officers.
- IV. Diagnostic Laboratory.
- V. Change in Venereal Disease reporting.
- VI. Outbreaks.
- VII. Special remarks on certain Communicable Diseases.

GENERAL REMARKS.

In the year 1925 has taken place the annually repeated demonstration that in any large population group communicable diseases in general remain uncontrolled to the same extent that active co-operation of everyone in the community is lacking. Apparently we have made but slight progress toward obtaining this indispensable co-operation. Even when specific preventive measures of demonstrated efficacy exist, as in diphtheria for example, deep rooted and persistent suspicion against such methods makes their general application impossible. Year after year examples appear of outbreaks of disease traceable to unpasteurized milk supplies, and yet so far the public interest has been subordinated to the interests of private concerns and individuals, with certain outstanding exceptions.

However, a hopeful feature of the year's developments has been an increase in the number of cities and towns requiring pasteurization of all milk sold, unless drawn from cows tested and found negative to the tuberculin reaction. These cities and towns now include New Bedford, Boston, Cambridge, Dedham, Milton, Natick, Needham, Newton, Quincy, Wellesley, Belmont, Somerville, Leominster, Springfield, Pittsfield and Brockton. Others are expected to be added to the list in the near future.

While it is indisputable that the number of cases of communicable disease transmitted by agencies other than human contact, (water, milk, food and insects) is constantly decreasing, the common communicable diseases of childhood still defy control. Of these we can point to measles, German measles, mumps, chickenpox, scarlet fever and whooping cough which together contribute no mean aggregate of illness, complications and deaths. The reasons for their prevalence are not far to seek. Whereas the mortality in the relation to the number of cases is low in each one of these diseases, and whereas the complications are not so strikingly evident as, for example, in poliomyelitis, the common communicable diseases of childhood are generally regarded as of little consequence and parents are unwilling to isolate children having catarrhal symptoms, sore throats and skin eruptions until a diagnosis can be made, or until all danger of contagion has passed. If these common diseases were as fatal as smallpox or even as diphtheria, or as crippling as poliomyelitis, the public interest in their control would be correspondingly more intense.

As regards specific preventive measures in smallpox, typhoid and diphtheria, experience has shown that when these diseases are present in excessive proportions little hesitation is found in accepting the preventive treatment. But as for anticipating the outbreak or attack of the disease, this is generally regarded by the public as a superfluous and questionable fad.

Especially in the smaller communities the meagre appropriations made for health service reflect the public indifference and apathy toward these problems. Health departments are still popularly supposed to be occupied chiefly with collection of garbage, and posting notices where contagious disease is present. The gradually broadening conception of the functions and responsibilities of the health department is much more evident in the cities than in the towns, but even in the cities there is still room for much improvement in this respect.

CHANGES IN PERSONNEL.

December 1, 1924 — Dr. Richard P. MacKnight appointed District Health Officer.

April 30, 1925 — Frances B. Mayer, Social Worker, resigned.

May 31, 1925 — Pauline D. Hitchcock, Assistant Bacteriologist, resigned.

September 21, 1925 — Greta A. Bellows appointed Assistant Bacteriologist.

October 1, 1925 — Dr. Helen I. McGillicuddy appointed lecturer.

October 28, 1925 — Dr. George H. Bigelow appointed Commissioner of Public Health.

November 13, 1925 — Dr. Charles E. Simpson, District Health Officer, died.

ACTIVITIES OF DISTRICT HEALTH OFFICERS.

The major activity of the District Health Officers during the year was concerned with the work of preparing the field for the examination of underweight school children conducted by the Division of Tuberculosis. This work involved much time and effort devoted to personal interviews with members of the boards of health and school committees, public health nurses, school nurses, and private organizations as well as addresses and lectures before various groups. Furthermore as the work of following up the results of examinations is necessarily a function of the local organizations, public and private, the District Health Officers were occupied with ascertaining and developing the facilities for this work before the examinations took place.

In spite of the outstanding importance of the tuberculosis program this year, the other activities of the District Health Officers have not been neglected. Various communities have been prevailed upon to assume a consistent program of diphtheria prevention. In one instance the District Health Officer working alone immunized 1,500 children in a city where no physician could be found sufficiently interested to even assist. Obviously, no consistent program is to be looked for under such conditions, but it is to be hoped that the demonstration will arouse interest where it was lacking before.

The investigation of the prevalence of cancer in the state, undertaken by legislative direction, involved a considerable expenditure of effort on the part of the District Health Officers in interviewing physicians and others who might be able to throw some light on the matter.

Similarly considerable attention was given to preparing the field for the examination of high school pupils for thyroid enlargement. This work was conducted by the U. S. Public Health Service assisted by members of the Department.

In conjunction with members of the Division of Sanitary Engineering a large number of inspections of camps were made during the summer. As these inspections were made at the request of camp proprietors or boards of health interested in camp sanitation, the results were in general satisfactory. Various improvements suggested were followed out or will be before next summer.

The problem of camp sanitation will assume an increasing importance in the work of the District Health Officers as more requests for inspections are received. Furthermore, they will be occupied with the problem of interesting local officials in the matter, to the end that inspections may be made on casual or unregulated camps.

REGULATIONS FOR REPORTING VENEREAL DISEASES CHANGED.

On October 1, 1925, venereal diseases were made reportable to local boards of health. As heretofore reports are made by number in the first instance and on cases which are in a communicable stage. Cases may afterward be reported by name if, in the opinion of the physician, they are a menace to others.

Gonorrhea and syphilis were made reportable in 1918. As an innovation directly traceable to war conditions, it was thought advisable to have reports made directly to the Department of Public Health instead of to the local authorities. This procedure was a compromise between local reporting and no reporting at all.

But as the main object of all disease reporting is to remind people that communicable diseases are matters of public concern and public responsibility, and as the responsibility for communicable disease control is essentially a local responsibility,

it was found that the method in use for the past seven years was unsuitable to the purpose of bringing home to the various communities their problem and responsibility in relation to venereal diseases.

As a further step toward the object of promoting local interest in social problems arrangements have been made for the purpose of organizing study groups under the direction of Dr. Helen I. McGillicuddy. The object of such study courses is to consider the existing problems coming under the general heading of Social Hygiene. As an aspect of the general problem, venereal disease prevention is included. This is believed to be a considerable improvement over localized and sporadic attempts to promote interest in the problem of venereal disease prevention apart from the other social problems with which it is related, notably the problems of education and recreation.

DIAGNOSTIC LABORATORY.

In agreement with the marked diminution in the prevalence of diphtheria, the number of throat cultures examined has fallen off considerably. However, the total number of laboratory examinations shows no great change.

It is to be regretted that a considerable proportion of time and effort on the part of the laboratory staff is devoted to making examinations from which little or no benefit is derived. The continued and ever increasing demand for such examinations is a serious detriment to the efficiency of the laboratory and has necessitated an increase in the personnel.

The number of release cultures on typhoid cases received is far from satisfactory. Even assuming that most typhoid cases are cared for in hospitals the majority of hospitals do not examine cultures for release and do not send them to any laboratory. Consequently among the 600 odd cases occurring each year there must be a considerable number of undiscovered carriers abroad. A large proportion of cases is now believed to be due to these undiscovered carriers.

During the year the Bacteriological Laboratory examined 28,178 specimens.

TABLE I. — *Shows the Number and Kinds of Examinations.*

Diphtheria	14,697	Gonorrhea	4,311
Tuberculosis	4,080	Malaria	108
Typhoid fever Widal test	1,736	Pneumonia	491
Typhoid fever Culture test	1,410	Miscellaneous	1,395 ¹

Of the 491 specimens of sputum examined for pneumococcus type, 113 showed no pneumococci. For the remainder the types were distributed as follows:

Type I.	Type II.	Type III.	Group IV.
32	21	50	275

TABLE II. — *Shows Results of Examinations.*

	Positive.	Negative.	Atypical.	Total.
Diphtheria (primary)	899	9,427	—	10,326
Diphtheria (release)	951	3,420	—	4,371
Tuberculosis (sputum)	945	3,135	—	4,080
Typhoid fever (Widal)	271	1,432	33	1,736
Typhoid fever (culture test)	90	1,320	—	1,410
Malaria	1	107	—	108
Gonorrhea	924	3,387	—	4,311
Pneumococcus Type Determination	—	—	—	491

¹ Including 1,101 examinations for hemolytic streptococci, 107 guinea pig inoculations for tubercle bacilli and 56 paratyphoid tests.

workers had left the employ of the dealer before the investigation could be carried out. The carrier may have been among these men. Most of the 8 cases connected with the single milk supply had an onset between the 15th and 20th of September. Probably the infection of the milk occurred on one occasion only.

The other 10 cases reported from Quincy in September and October could not be traced to any single source. Many were of the "vacation" type. Three of these 10 cases occurred in one family, of which two were probably contact infections. There was one death in this outbreak.

SPECIAL REMARKS ON CERTAIN COMMUNICABLE DISEASES.

Typhoid Fever.

YEAR.	Cases.	Case Rate per 100,000.	Deaths.	Death Rate per 100,000.
1915-1919 (av.)	1,454	38.7	172	4.6
1920	935	24.2	95	2.5
1921	917	23.3	119	3.0
1922	693	17.4	86	2.2
1923	622	15.4	70	1.7
1924	566	13.8	68	1.7
1925	592	14.2	72	1.7

Typhoid Cases, 1920-25, classified as to Probable Origin.

YEAR.	Total.	Contact.	Milk.	Water.	Food.	Carrier.	Unknown.	Per Cent Unknown.
1920	935	56	50	32	4	46	747	80
1921	917	95	146	6	0	13	657	72
1922	693	66	18	5	6	5	593	85
1923	622	30	9	23	3	15	542	87
1924	566	51	17	25	15	4	454	80
1925	592	37	8	15	12	3	517	87

The increased number of cases classified as due to "food" in 1924 and 1925 is the result of increased effort to obtain in each typhoid case a statement of whether involved shellfish (particularly clams) had been eaten within 3 weeks previous to the onset of the disease.

The large proportion of cases classified "unknown" as to origin is, as in the past few years, partly attributable to the increased amount of travelling especially by automobile.

Typhoid Cases, 1917-25, classified by Age Groups.

YEAR.	TOTAL.		0-14.		15-24.		25-34.		35-44.		45 PLUS.		UNKNOWN.	
	C.	%	C.	%	C.	%	C.	%	C.	%	C.	%	C.	%
1917	1,547	100	312	20.2	344	22.2	265	17.1	140	9.0	116	7.5	370	23.9
1918	1,064	100	320	30.0	255	24.0	195	18.3	141	13.2	89	8.3	67	6.3
1919	938	100	273	29.1	226	24.1	182	19.4	113	12.0	89	9.5	55	5.9
1920	935	100	299	32.0	218	23.3	190	20.3	112	12.0	96	10.3	20	2.1
1921	917	100	345	37.6	176	19.2	150	16.4	127	13.8	106	11.6	13	1.4
1922	693	100	196	28.2	176	25.4	123	17.8	87	12.6	89	12.8	22	3.2
1923	622	100	193	31.0	158	25.4	106	17.0	76	12.2	66	10.6	23	3.7
1924	566	100	157	27.7	132	23.3	102	18.0	76	13.4	82	14.5	17	3.0
1925	592	100	161	27.2	141	23.8	113	19.1	79	13.3	71	11.9	27	4.6

Typhoid Deaths, 1917-25, classified by Age Groups.

YEAR.	0-14.		15-39.		40 PLUS.		Total Deaths.	% 100
	D.	%	D.	%	D.	%		
1917	33	18.5	94	53.0	51	28.6	178	100
1918	18	11.0	102	64.0	40	25.0	160	100
1919	17	15.9	63	59.0	27	25.2	107	100
1920	15	15.8	51	53.7	29	30.5	95	100
1921	17	14.5	60	51.3	40	34.2	117	100
1922	11	12.8	50	58.2	25	29.0	86	100
1923	8	11.6	42	61.0	19	27.5	69	100
1924	9	13.2	32	47.0	27	39.7	68	100
1925	15	20.8	33	45.8	24	33.3	72	100

A slight upward tendency is observed in the proportion of cases and deaths from typhoid in persons over 40 years of age.

Diphtheria.

YEAR.	Cases.	Case Rate per 100,000.	Deaths.	Death Rate per 100,000.
1915-19 (av.)	8,347	221	677	17.9
1920	7,513	195	591	15.3
1921	9,100	231	607	15.4
1922	8,826	221	606	15.2
1923	9,018	223	579	14.3
1924	7,290	178	534	12.9
1925	4,482	108	329	7.9

The remarkable fall in the incidence of diphtheria which began in the autumn of 1924, has continued throughout the present year. Roughly the cases reported have numbered about two thirds those of last year, and the deaths about one-half. This change cannot apparently be attributed to any single cause and has been in conformity to a general tendency throughout the country during the year 1925.

Diphtheria Cases, 1920-25, classified by Age Groups.

YEAR.	0-5.		6-14.		15 Plus.		Total Age Given.	%
	C.	%	C.	%	C.	%		
1920	2,612	38.8	2,959	44.0	1,153	17.2	6,724	100
1921	3,259	39.1	3,841	46.0	1,244	14.9	8,344	100
1922	3,414	41.5	3,623	44.1	1,169	14.4	8,206	100
1923	3,440	40.5	3,917	46.0	1,158	13.5	8,515	100
1924	2,859	43.5	2,690	40.8	1,040	15.7	6,589	100
1925	1,776	43.5	1,629	40.0	670	16.5	4,075	100

The previously observed tendency in the age distribution of diphtheria cases to fall in the age group 6-14 years has continued. This may probably be attributed in part to the fact that the great proportion of immunization work has been done among school children. The age distribution of cases began to change about the same time that immunization work began, that is to say, in the year 1923.

Diphtheria Deaths by Age Groups.

[Five year averages.]

YEAR.	0-4.		5-9.		10 Plus.		Total.
	D.	%	D.	%	D.	%	
1915-1919	393	58.0	205	30.2	79	11.8	677
1920-1924	341	58.5	184	31.6	57	9.9	582

Smallpox.

Three cases were reported during the year, one each from the following places: Medford, North Attleboro and Tisbury. There were no deaths. The cases were all mild. One was a child of 5½ years, never vaccinated. Of the two adults one gave a history of successful vaccination in U. S. Navy 18 months before. The other was never successfully vaccinated. In the vaccinated case the disease was so mild that the diagnosis was in doubt for some days. No contact cases developed from any of the above.

Two of the three cases were almost certainly contracted outside the state and the third one probably so.

Smallpox.

YEAR.	Cases.	Deaths.
1920	29	2
1921	37	—
1922	2	—
1923	6	—
1924	12	2
1925	3	—

Gonorrhea and Syphilis.

YEAR.	GONORRHEA.		SYPHILIS.			Death Rate per 100,000.
	Cases.	Case Rate per 100,000.	Cases.	Case Rate per 100,000.	Deaths.	
1918	7,681	197	3,284	84.4	280	7.2
1919	9,435	246	4,127	107.5	281	7.3
1920	7,225	188	2,987	77.6	224	5.8
1921	5,563	141	2,497	63.4	200	5.1
1922	4,973	125	1,933	48.4	213	5.3
1923	4,885	121	1,891	46.7	194	4.7
1924	5,241	128	2,325	56.7	176	4.2
1925 ¹	5,192	125	2,147	51.6	141	3.4

¹ Reported locally from October 1st.

Contrary to expectations, the number of cases of gonorrhea and syphilis reported in the year 1925 has not changed greatly from the previous year. This in spite of the fact that the method of reporting was changed beginning October 1st. It is generally to be expected that a change in method of reporting will result in a change in the number of cases reported.

Distribution of Arsphenamine, Sulpharsphenamine and Bichloridol, by Years.

YEAR.	Arsphenamine. ¹	Sulpharsphenamine. ¹	Bichloridol. ²
1919	20,455	—	—
1920	25,364	—	—
1921	36,854	—	—
1922	42,083	—	9,680
1923	42,843	3,737 ³	12,800
1924	27,603	18,864	13,412
1925	26,121	27,911	17,043

Scarlet Fever.

YEAR.	Cases.	Case Rate per 100,000.	Deaths.	Death Rate per 100,000.	Fatality Per Cent.
1920	10,260	265	214	5.5	2.1
1921	8,331	212	191	4.9	2.3
1922	7,868	197	149	3.7	1.9
1923	12,300	304	155	3.8	1.3
1924	14,410	351	158	3.9	1.1
1925	10,319	248	117	2.8	1.1

Tuberculosis, Pulmonary.

YEAR.	Cases.	Case Rate per 100,000.	Deaths.	Death Rate per 100,000.	Fatality Per Cent.
1920	6,696	174	3,750	97.3	56
1921	6,168	157	3,272	83.1	53
1922	5,562	139	3,167	79.3	57
1923	5,356	132	3,062	75.7	57
1924	5,376	131	2,953	71.9	55
1925	5,385	130	2,889	69.5	54

Tuberculosis, Non-Pulmonary.

YEAR.	Cases.	Case Rate per 100,000.	Deaths.	Death Rate per 100,000.	Fatality Per Cent.
1920	800	20.8	650	16.8	81
1921	827	21.0	595	15.1	72
1922	817	20.5	569	14.3	70
1923	807	19.9	528	13.0	65
1924	946 ⁴	23.0	577	14.0	61
1925	825	19.8	547	13.2	66

In the year 1925, 548 cases of hilum tuberculosis were reported. These are not included in the above table.

¹ Based on 0.6 gram doses.² Collapsules.³ June to December.⁴ Includes 53 hilum tuberculosis.

Lobar Pneumonia.

YEAR.	Cases.	Case Rate per 100,000.	Deaths.	Death Rate per 100,000.
1920	5,558	143	2,842	73.8
1921	4,080	104	1,823	46.3
1922	5,194	130	2,344	58.7
1923	4,759	118	2,313	57.2
1924	4,552	111	1,944	47.4
1925	5,544	133	2,348	56.5

Measles.

YEAR.	Cases.	Case Rate per 100,000.	Deaths.	Death Rate per 100,000.
1920	32,141	835	352	9.1
1921	17,827	453	179	4.5
1922	23,291	583	218	5.5
1923	26,854	664	321	7.9
1924	22,425	547	165	4.0
1925	28,816	693	333	8.0

Whooping Cough.

YEAR.	Cases.	Case Rate per 100,000.	Deaths.	Death Rate per 100,000.
1920	9,994	260	546	14.2
1921	5,703	145	201	5.1
1922	6,823	171	294	7.4
1923	10,612	262	493	12.2
1924	4,062	99	147	3.6
1925	8,077	194	269	6.5

Cases and Deaths from Certain Communicable Diseases in Massachusetts from 1920 to 1925.

YEAR.	Population.	ACTINOMYCOSIS.		ANTERIOR POLIOMYELITIS.		ANTHRAX.	
		Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
1920 . . .	3,869,098	3	1	696	144	17	4
1921 . . .	3,935,743	2	1	233	48	6	—
1922 . . .	3,991,333	3	2	217	33	3	1
1923 . . .	4,046,923	6	4	223	35	7	2
1924 . . .	4,102,513	4	2	227	27	11	2
1925 . . .	4,158,103	3	1	167	51	5	1

YEAR.	Population.	CHICKEN POX.		DOG BITE.		DYSENTERY.	
		Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
1920 . . .	3,869,098	5,355	11	67	—	37	26
1921 . . .	3,935,743	8,324	9	118	—	25	24
1922 . . .	3,991,333	5,177	8	181	—	14	10
1923 . . .	4,046,923	7,983	11	252	—	3	2
1924 . . .	4,102,513	5,985	9	208	—	25	3
1925 . . .	4,158,103	7,516	9	186	—	13	6

Cases and Deaths from Certain Communicable Diseases in Massachusetts from 1920 to 1925 — Concluded.

YEAR.	Population.	ENCEPHALITIS LETHARGICA.		EP. CEREBROSPINAL MENINGITIS.		GERMAN MEASLES.	
		Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
1920 . . .	3,869,098	—	—	182	129	484	—
1921 . . .	3,935,743	117	81	164	49	649	1
1922 . . .	3,991,333	163	83	105	47	480	2
1923 . . .	4,046,923	180	85	121	41	527	—
1924 . . .	4,102,513	106	58	128	39	1,644	3
1925 . . .	4,158,103	146	96	112	40	6,778	3

YEAR.	Population.	INFLUENZA.		MALARIA.		MUMPS.	
		Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
1920 . . .	3,869,098	36,312	1,623	60	5	5,962	6
1921 . . .	3,935,743	735	153	49	2	3,952	7
1922 . . .	3,991,333	7,453	569	48	4	4,358	2
1923 . . .	4,046,923	2,466	742	23	3	7,707	6
1924 . . .	4,102,513	405	277	36	2	9,431	12
1925 . . .	4,158,103	1,244	543	11	6	2,674	4

YEAR.	Population.	OPHTHALMIA NEONATORUM. ¹		PELLAGRA.		SEPTIC SORE THROAT.		TETANUS.	
		Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
1920 . . .	3,869,098	1,638	—	16	13	153	29	25	21
1921 . . .	3,935,743	1,573	—	14	14	140	42	39	28
1922 . . .	3,991,333	1,219	—	15	9	123	25	33	21
1923 . . .	4,046,923	1,480	—	16	11	197	27	28	18
1924 . . .	4,102,513	1,820	—	18	12	170	47	41	23
1925 . . .	4,158,103	1,988	—	19	10	116	29	45	31

¹ Includes suppurative conjunctivitis.

YEAR.	Population.	TRACHOMA.		TRICHINOSIS.		GLANDERS.		HOOKWORM.	
		Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
1920 . . .	3,869,098	87	—	5	—	—	—	—	—
1921 . . .	3,935,743	97	—	10	1	—	—	1	—
1922 . . .	3,991,333	96	—	19	4	—	—	42	—
1923 . . .	4,046,923	62	—	13	—	—	—	12	—
1924 . . .	4,102,513	55	—	40	1	—	—	18	—
1925 . . .	4,158,103	75	—	26	—	—	—	23	—

YEAR.	Population.	LEPROSY.		RABIES.		TYPHUS FEVER.	
		Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
1920 . . .	3,869,098	3	3	—	—	—	—
1921 . . .	3,935,743	1	1	1	3	2	1
1922 . . .	3,991,333	1	—	2	5	—	—
1923 . . .	4,046,923	1	—	3	1	1	—
1924 . . .	4,102,513	—	—	1	1	—	—
1925 . . .	4,158,103	—	—	2	3	2	—

Cases and Deaths, with Case and Death Rates per 100,000 Population for All Reportable Diseases during the Year 1925.

DISEASE.	Cases.	Deaths.	Case Rate.	Death Rate.	Fatality Rate (Per Cent)
Actinomycosis	3	1	.07	.02	33.3
Anterior Poliomyelitis	167	51	4.0	1.2	30.5
Anthrax	5	1	.1	.02	20.0
Chicken Pox	7,516	9	180.8	.2	.1
Diphtheria	4,482	329	107.8	7.9	7.3
Dog Bite	186	—	4.5	—	—
Dysentery	13	6	.3	.1	46.2
Encephalitis Lethargica	146	96	3.5	2.3	65.7
Epidemic Cerebrospinal Meningitis	112	40	2.7	.9	35.7
German Measles	6,778	3	163.0	.07	.04
Gonorrhea	5,192	11	124.9	.3	.2
Hookworm	23	—	.6	—	—
Influenza	1,244	543	29.9	13.1	43.6
Malaria	11	6	.3	.1	54.5
Measles	28,816	332	693.0	8.0	1.2
Mumps	2,674	4	64.3	.09	.1
Ophthalmia Neonatorum ¹	1,988	—	47.8	—	—
Pellagra	19	10	.5	.2	52.6
Pneumonia, Lobar	5,544	2,348	133.3	56.5	42.3
Rabies	2	3	.04	.07	100.0
Scarlet Fever	10,319	117	248.2	2.8	1.1
Septic Sore Throat	116	29	2.8	.7	25.0
Smallpox	3	—	.07	—	—
Syphilis	2,147	141	51.6	3.4	6.6
Tetanus	45	33	1.1	.8	73.3
Trachoma	75	—	1.8	—	—
Trichinosis	26	—	.6	—	—
Tuberculosis, Pulmonary	5,385	2,889	129.5	69.5	53.6
Tuberculosis, Other Forms	825	547	19.8	13.2	66.3
Tuberculosis, Hilum	547	—	13.2	—	—
Typhoid Fever	592	72	14.2	1.7	12.2
Typhus Fever	2	—	.04	—	—
Whooping Cough	8,077	269	194.2	6.5	3.3
Total	93,080	7,890	2,238.5	189.7	8.5

¹ Includes 737 cases of suppurative conjunctivitis.

Index to Line Numbers in the Table of Cases and Deaths from Diseases Dangerous to the Public Health, 1925.

Abington	120	East Bridgewater	151	Lowell	11
Acton	193	East Brookfield	286	Ludlow	88
Acushnet	139	East Longmeadow	160	Lunenburg	215
Adams	63	Eastham	322	Lynn	12
Agawam	112	Easthampton	72	Lynnfield	256
Alford	354	Easton	124		
Amesbury	73	Edgartown	266	Malden	20
Amherst	117	Egremont	324	Manchester	188
Andover	76	Enfield	304	Mansfield	105
Arlington	35	Erving	257	Marblehead	91
Ashburnham	203	Essex	255	Marion	264
Ashby	292	Everett	29	Marlborough	51
Ashfield	288			Marshfield	223
Ashland	186	Fairhaven	75	Mashpee	344
Athol	80	Fall River	8	Mattapoisett	233
Attleboro	44	Falmouth	134	Maynard	96
Auburn	129	Fitchburg	26	Medfield	147
Avon	196	Florida	337	Medford	23
Ayer	168	Foxborough	131	Medway	162
		Framingham	42	Melrose	45
Barnstable	121	Franklin	100	Mendon	282
Barre	154	Freetown	230	Merrimac	197
Becket	301			Methuen	43
Bedford	241	Gardner	48	Middleborough	83
Belchertown	170	Gay Head	358	Middlefield	355
Bellingham	173	Georgetown	216	Middleton	229
Belmont	56	Gill	290	Milford	59
Berkley	274	Gloucester	38	Millbury	108
Berlin	277	Goshier	350	Millis	222
Bernardston	294	Gosnold	361	Milville	194
Beverly	40	Grafton	101	Milton	67
Billerica	130	Granby	298	Monroe	360
Blackstone	133	Granville	311	Monson	126
Blandford	327	Great Barrington	110	Montague	93
Bolton	299	Greenfield	58	Monterey	339
Boston	3	Greenwich	325	Montgomery	357
Bourne	167	Groton	191	Mount Washington	365
Boxborough	342	Groveland	190		
Boxford	313			Nahant	231
Boylston	284	Hadley	175	Nantucket	161
Braintree	65	Halifax	310	Natick	68
Brewster	302	Hamilton	208	Needham	86
Bridgewater	81	Hampden	308	New Ashford	364
Brimfield	295	Hancock	319	New Bedford	10
Brockton	16	Hanover	180	New Braintree	330
Brookfield	254	Hanson	202	New Marlborough	283
Brookline	27	Hardwick	166	New Salem	316
Buckland	234	Harvard	287	Newbury	248
Burlington	246	Harwich	206	Newburyport	54
		Hatfield	182	Newton	19
Cambridge	9	Haverhill	22	Norfolk	270
Canton	119	Hawley	338	North Adams	39
Carlisle	318	Heath	345	North Andover	102
Carver	260	Hingham	115	North Attleborough	79
Charlemont	297	Hinsdale	281	North Brookfield	165
Charlton	199	Holbrook	156	North Reading	227
Chatham	225	Holden	152	Northampton	37
Chelmsford	104	Holland	362	Northborough	211
Chelsea	24	Holliston	177	Northbridge	77
Cheshire	217	Holyoke	17	Northfield	221
Chester	240	Hopedale	159	Norton	179
Chesterfield	326	Hopkinton	185	Norwell	245
Chicopee	30	Hubbardston	279	Norwood	61
Chilmark	351	Hudson	92		
Clarksburg	268	Hull	183	Oak Bluffs	259
Clinton	60	Huntington	236	Oakham	314
Cohasset	172			Orange	125
Colrain	235	Ipswich	116	Orleans	278
Concord	99	Kingston	187	Otis	332
Conway	285			Oxford	143
Cummington	320				
		Lakeville	247	Palmer	74
Dalton	141	Lancaster	184	Paxton	312
Dana	307	Lanesborough	272	Peabody	46
Danvers	70	Lawrence	15	Pelham	315
Dartmouth	84	Lee	142	Pembroke	243
Dedham	62	Leicester	140	Pepperell	178
Deerfield	169	Lenox	174	Peru	363
Dennis	224	Leominster	41	Petersham	305
Dighton	157	Leverett	306	Phillipston	335
Douglas	195	Lexington	98	Pittsfield	25
Dover	280	Leyden	349	Plainfield	348
Dracut	109	Lincoln	261	Plainville	242
Dudley	135	Littleton	250	Plymouth	66
Dunstable	341	Longmeadow	153	Plympton	317
Duxbury	228				

Prescott	353	Southborough	207	Watertown	34
Princeton	303	Southbridge	55	Wayland	200
Provincetown	148	Southwick	265	Webster	64
		Spencer	107	Wellesley	82
Quincy	18	Springfield	7	Wellfleet	300
		Sterling	239	Wendell	331
Randolph	122	Stockbridge	219	Wenham	273
Raynham	205	Stoneham	85	West Boylston	212
Reading	89	Stoughton	95	West Bridgewater	164
Rehoboth	198	Stow	271	West Brookfield	262
Revere	33	Sturbridge	218	West Newbury	258
Richmond	309	Sudbury	252	West Springfield	57
Rochester	276	Sunderland	263	West Stockbridge	269
Rockland	94	Sutton	204	West Tisbury	343
Rockport	146	Swampscott	87	Westborough	111
Rowe	346	Swansea	155	Westfield	47
Rowley	251			Westford	149
Royalston	296	Taunton	31	Westhampton	340
Russell	253	Templeton	136	Westminster	213
Rutland	201	Tewksbury	127	Weston	171
		Tisbury	249	Westport	137
Salem	28	Tolland	359	Westwood	226
Salisbury	220	Topsfield	291	Weymouth	50
Sandisfield	323	Townsend	214	Whatley	267
Sandwich	244	Truro	321	Whitman	97
Saugus	69	Tyngsborough	275	Wilbraham	176
Savoy	333	Tyringham	347	Williamsburg	210
Scituate	181			Williamstown	144
Seekonk	138	Upton	209	Wilmington	150
Sharon	163	Uxbridge	113	Winchendon	114
Sheffield	232			Winchester	71
Shelburne	238	Wakefield	53	Windsor	334
Sherborn	293	Wales	328	Winthrop	52
Shirley	192	Walpole	106	Woburn	49
Shrewsbury	118	Waltham	32	Worcester	5
Shutesbury	356	Ware	90	Worthington	329
Somerset	132	Wareham	123	Wrentham	158
Somerville	14	Warren	145		
South Hadley	103	Warwick	336	Yarmouth	237
Southampton	289	Washington	352	Tewksbury State Infirmary	366

Cases and Deaths from Diseases Dangerous

Line No.	CITIES AND TOWNS GROUPED IN ORDER OF POPULATION.	Popu- lation esti- mated as of July 1, 1925.	22		25A		10		24 Ep. Cere- bro- spinal Menin- gitis.		25B		40	
			An- terior Polio- mye- litis.	Chicken Pox.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
1	Massachusetts	4,158,103	167	51	7516	9	4482	329	112	40	6778	3	5192	11
2	CITIES OF OVER 500,000.													
3	Boston	781,123	39	9	1528	2	1039	98	33	25	582	-	2470	2
4	CITIES OVER 150,000.													
5	Worcester	191,281	3	2	552	-	350	30	4	3	542	1	290	-
6	CITIES, 100,000-150,000.	725,106	21	3	1053	2	694	50	15	5	1224	-	915	5
7	Springfield	142,658	3	-	176	-	75	6	2	3	650	-	261	1
8	Fall River	129,398	5	1	128	-	136	15	2	-	7	-	119	2
9	Cambridge	120,144	5	-	470	-	174	7	2	-	107	-	196	-
10	New Bedford	119,459	1	-	129	2	103	9	-	1	288	-	50	-
11	Lowell	110,179	6	2	88	-	58	4	6	-	150	-	158	-
12	Lynn	103,268	1	-	62	-	148	9	3	1	22	-	131	2
13	CITIES, 50,000-100,000.	484,918	18	1	782	-	540	46	8	2	431	-	278	1
14	Somerville	99,315	1	-	170	-	117	4	2	-	44	-	92	-
15	Lawrence	93,492	4	-	67	-	94	18	3	1	6	-	54	1
16	Brockton	65,300	1	1	131	-	38	5	-	-	130	-	15	-
17	Holyoke	60,925	1	-	32	-	84	9	1	-	60	-	44	-
18	Quincy	60,635	4	-	52	-	129	1	-	-	54	-	20	-
19	Newton	53,334	5	-	272	-	19	1	-	-	95	-	15	-
20	Malden	51,917	2	-	58	-	59	8	2	1	42	-	38	-
21	CITIES AND TOWNS, 25,000-50,000.	564,076	27	13	855	1	315	40	20	1	978	-	641	1
22	Haverhill	49,011	5	2	101	-	71	3	3	-	648	-	91	1
23	Medford	48,036	1	-	126	-	31	-	4	-	29	-	44	-
24	Chelsea	47,440	-	-	63	-	53	2	3	1	11	-	189	-
25	Pittsfield	47,120	4	4	35	-	92	3	2	-	16	-	55	-
26	Fitchburg	43,732	-	1	13	-	102	12	1	-	23	-	9	-
27	Brookline	42,916	6	2	64	-	11	-	-	-	60	-	20	-
28	Salem	42,835	1	1	133	-	172	14	4	-	41	-	49	-
29	Everett	42,165	2	-	58	-	59	1	2	-	64	-	38	-
30	Chicopee	42,152	-	-	16	1	50	2	-	-	12	-	10	-
31	Taunton	39,356	3	1	5	-	12	1	1	-	1	-	51	-
32	Waltham	34,928	3	2	98	-	16	1	-	-	29	-	13	-
33	Revere	33,472	-	-	8	-	101	1	-	-	9	-	48	-
34	Watertown	25,671	1	-	19	-	26	-	-	-	6	-	16	-
35	Arlington	25,242	1	-	116	-	19	-	-	-	29	-	8	-
36	CITIES AND TOWNS, 10,000-25,000	656,298	36	8	1203	1	624	45	19	3	1217	-	278	-
37	Northampton	24,249	-	-	99	1	7	-	3	1	302	-	29	-
38	Gloucester	23,395	-	-	11	-	60	5	-	-	-	-	10	-
39	North Adams	22,738	8	2	1	-	24	6	1	-	1	-	1	-
40	Beverly	22,691	2	1	41	-	28	1	-	-	22	-	6	-
41	Leominster	22,233	1	-	2	-	21	1	2	1	16	-	6	-
42	Framingham	21,271	1	-	47	-	22	1	-	-	119	-	6	-
43	Methuen	20,864	-	-	64	-	16	1	-	-	8	-	-	-
44	Attleboro	20,665	1	-	32	-	8	-	-	-	-	-	18	-
45	Melrose	20,258	2	-	26	-	27	-	1	-	12	-	7	-
46	Peabody	19,885	1	-	16	-	43	3	-	-	55	-	16	-
47	Westfield	19,377	-	-	13	-	18	6	-	-	46	-	6	-
48	Gardner	18,814	-	-	-	-	-	-	-	-	1	-	8	-
49	Woburn	18,456	3	1	13	-	15	-	-	-	-	-	4	-
50	Weymouth	17,357	-	-	7	-	15	1	-	-	-	-	5	-
51	Marlborough	16,293	-	-	17	-	9	1	-	-	35	-	-	-
52	Winthrop	16,191	1	-	97	-	3	-	1	-	28	-	8	-
53	Wakefield	15,734	-	-	25	-	9	-	-	-	1	-	1	-
54	Newburyport	15,658	-	-	47	-	8	2	2	-	62	-	5	-
55	Southbridge	15,548	-	-	6	-	28	3	-	-	-	-	7	-
56	Belmont	15,471	1	-	127	-	5	-	-	-	62	-	21	-
57	West Springfield	15,415	-	-	5	-	7	2	1	-	21	-	8	-
58	Greenfield	15,236	1	-	100	-	11	1	1	-	66	-	11	-
59	Milford	14,843	-	-	2	-	11	2	-	-	88	-	3	-
60	Clinton	14,237	-	-	29	-	14	-	2	-	-	-	8	-
61	Norwood	14,223	-	-	20	-	56	1	-	1	14	-	7	-
62	Dedham	14,067	-	-	21	-	20	1	-	-	7	-	4	-
63	Adams	13,551	4	-	12	-	18	-	1	-	2	-	8	-
64	Webster	13,395	-	-	34	-	30	1	1	-	2	-	3	-
65	Braintree	13,317	-	-	67	-	15	-	-	-	4	-	11	-
66	Plymouth	13,182	-	-	5	-	5	-	-	-	29	-	20	-
67	Milton	13,027	-	-	67	-	1	-	1	-	25	-	6	-
68	Natick	12,964	-	-	26	-	6	1	-	-	1	-	6	-
69	Saugus	12,832	-	-	11	-	6	-	-	-	13	-	3	-
70	Danvers	11,831	1	-	7	-	5	-	-	-	-	-	1	-
71	Winchester	11,616	2	2	23	-	13	-	-	-	18	-	5	-
72	Easthampton	11,602	-	-	8	-	5	1	-	-	14	-	-	-
73	Amesbury	11,286	2	-	28	-	11	1	-	-	18	-	19	-
74	Palmer	11,099	1	-	1	-	5	1	-	-	14	-	3	-
75	Fairhaven	10,995	1	-	5	-	4	-	2	-	95	-	-	-

to the Public Health, 1925.

11	101	7	13	40A	8	38	31, 37 37A, 37B	32-36E	1	9												
Influenza.	Lobar Pneumonia.	Measles.	Mumps.	Oph- thalmia Neona- torum.	Scarlet Fever.	Syphilis.	Tuber- culosis Pulmo- nary.	Tuber- culosis, Other Forms.	Ty- phoid Fever.	Whoop- ing Cough.												
Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.											
1244	543	5544	2348	28816	332	2674	4	1988	-	10819	117	2147	141	5385	2389	825	547	592	72	8077	269	1
361	81	1811	550	6675	111	286	-	1096	-	2676	47	894	56	1688	664	260	115	123	27	1989	68	2
29	13	309	122	2419	19	28	-	182	-	481	5	216	7	226	117	37	29	20	4	508	18	3
150	96	970	335	6156	89	290	-	292	-	1701	16	336	23	997	435	216	93	94	7	1266	50	4
46	37	188	79	204	-	132	1	48	-	676	6	151	4	126	60	24	12	11	2	264	5	5
60	26	203	76	1236	30	13	-	76	-	130	1	23	4	219	99	28	25	37	1	168	14	6
31	3	280	83	1386	12	39	-	28	-	221	1	35	2	162	88	26	9	16	2	500	6	7
4	3	12	77	33	784	11	63	-	104	-	189	4	40	4	212	90	91	19	9	119	10	8
6	15	126	62	608	9	37	1	20	-	250	3	67	1	123	74	27	19	11	-	47	3	9
237	64	534	248	2743	25	277	-	201	-	910	15	104	5	488	217	93	67	87	8	1212	21	10
19	8	152	52	683	4	18	-	24	-	230	4	12	1	108	38	23	16	13	-	185	9	11
15	17	73	36	620	9	41	-	28	-	178	5	35	1	81	43	19	11	25	1	173	5	12
-	4	79	39	77	-	69	-	106	-	68	1	14	-	65	16	14	9	6	2	183	-	13
3	7	40	33	79	-	26	-	4	-	43	-	27	3	70	58	6	13	3	1	66	3	14
165	8	47	32	754	6	29	-	3	-	131	-	8	-	61	20	18	10	23	1	198	3	15
3	9	59	23	126	-	89	-	18	-	104	-	4	-	49	20	4	2	9	1	328	-	16
32	11	84	33	404	6	5	-	18	-	156	5	4	-	54	22	9	6	8	1	79	1	17
100	64	762	335	3578	26	355	-	83	-	1352	11	297	6	631	263	76	68	81	10	764	38	18
15	6	119	31	574	5	103	-	12	-	126	2	29	1	63	15	10	3	5	-	97	1	19
10	3	78	24	481	1	37	-	9	-	155	-	5	-	44	14	6	2	6	-	101	-	20
7	5	87	36	362	4	3	-	22	-	104	-	168	-	88	31	3	6	11	2	91	2	21
5	7	33	29	24	2	2	-	-	-	94	2	13	1	42	25	2	3	12	2	48	5	22
3	4	60	31	29	-	32	-	3	-	46	-	9	1	41	25	9	12	7	3	29	17	23
5	2	38	24	545	1	14	-	1	-	55	-	3	-	33	24	2	3	6	-	48	4	24
25	4	45	17	432	-	-	-	3	-	133	2	4	-	56	19	9	11	3	1	36	4	25
5	6	80	23	408	5	2	-	11	-	179	2	7	-	52	17	9	2	11	-	88	5	26
2	7	29	16	4	-	1	-	4	-	68	-	8	-	54	29	5	9	2	-	16	1	27
2	6	21	37	9	2	-	-	4	-	51	1	28	1	55	37	1	5	1	1	5	-	28
13	7	52	29	329	-	3	-	3	-	126	1	7	1	30	15	8	8	3	-	35	-	29
-	1	32	12	96	5	1	-	4	-	103	1	7	-	21	3	8	1	6	-	9	2	30
4	2	45	12	123	-	7	-	3	-	66	-	3	1	22	4	2	2	1	-	49	1	31
4	4	43	14	162	1	150	-	4	-	46	-	6	1	30	5	2	1	7	1	112	-	32
217	96	784	361	4080	42	750	-	44	-	1800	12	104	26	661	339	78	83	104	10	1024	38	33
3	4	25	17	57	2	14	-	-	-	88	-	8	11	59	39	1	6	5	-	14	1	34
-	1	4	5	12	34	-	-	1	-	9	-	3	-	13	5	1	3	11	1	8	6	35
2	-	70	20	54	-	-	-	4	-	106	2	3	2	22	6	3	1	4	-	28	1	36
6	1	49	21	145	1	6	-	-	-	18	-	1	2	23	7	4	3	2	2	-	-	37
83	6	20	22	512	4	32	-	1	-	140	-	6	1	40	8	4	1	3	1	52	1	38
2	3	18	7	319	-	80	-	2	-	87	2	-	1	28	7	1	2	3	2	93	1	39
-	2	17	10	12	-	2	-	1	-	39	1	12	1	33	36	3	5	6	1	32	1	40
-	4	40	9	378	-	9	-	3	-	58	1	4	-	20	10	7	4	5	-	46	2	41
2	3	34	9	49	1	2	-	2	-	58	-	10	1	12	7	7	3	-	-	12	-	42
7	3	30	24	27	-	1	-	3	-	15	-	5	-	8	17	1	2	3	1	3	1	43
1	1	21	13	226	13	-	-	-	-	28	-	1	-	53	8	3	5	3	2	6	4	44
5	4	19	12	81	1	-	-	-	-	33	-	2	-	12	11	-	1	2	-	14	3	45
2	2	5	12	44	-	-	-	-	-	33	2	-	-	13	5	5	3	1	-	29	1	46
2	7	28	18	20	1	8	-	-	-	51	-	3	1	15	10	1	2	2	1	8	-	47
3	-	14	3	120	1	2	-	-	-	23	-	-	-	12	5	3	-	5	-	80	5	48
9	1	23	5	38	-	2	-	-	-	49	-	1	-	15	6	-	-	4	-	12	2	49
3	-	28	11	229	-	159	-	3	-	78	-	2	1	6	10	2	6	2	-	6	-	50
1	2	14	4	7	-	1	-	-	-	1	-	2	1	8	4	2	1	2	-	-	-	51
20	3	21	4	301	2	10	-	2	-	27	1	-	1	20	8	2	1	3	-	68	-	52
-	4	13	5	25	-	1	-	1	-	69	-	1	1	17	4	1	2	-	-	10	-	53
-	3	11	2	18	-	239	-	7	-	84	-	3	1	10	4	1	1	3	-	106	-	54
1	1	41	13	23	-	-	-	-	-	98	-	-	-	8	1	2	-	-	-	7	-	55
1	3	15	5	202	2	1	-	-	-	139	-	1	-	11	5	2	-	-	-	62	2	56
1	1	8	5	19	1	17	-	-	-	29	-	2	-	-	2	-	-	2	-	19	-	57
4	1	7	2	12	-	35	-	2	-	39	-	1	2	16	6	3	2	1	-	10	-	58
1	5	14	5	8	2	3	-	2	-	17	-	15	-	8	3	-	1	1	-	7	-	59
-	3	15	8	14	-	-	-	-	-	34	-	3	-	8	1	2	2	2	-	30	-	60
12	3	13	1	37	-	1	-	1	-	24	-	1	-	2	2	-	-	1	-	17	-	61
3	2	20	14	30	-	2	-	1	-	60	-	1	1	23	13	1	3	7	-	5	-	62
2	4	16	8	344	3	26	-	1	-	18	-	1	-	10	5	-	2	2	-	35	1	63
10	1	34	8	6	-	6	-	1	-	53	-	3	-	13	7	5	2	2	-	-	-	64
-	2	26	9	185	2	31	-	-	-	34	-	3	-	10	3	1	2	-	-	4	-	65
-	-	-	-	2	-	-	-	-	-	34	-	3	-	9	3	-	4	-	-	2	1	66
3	10	3	43	-	3	-	-	2	-	22	-	-	-	12	4	2	2	1	-	6	1	67

Cases and Deaths from Diseases Dangerous

Line No.	CITIES AND TOWNS GROUPED IN ORDER OF POPULATION.	Popu- lation esti- mated as of July 1, 1925.	22 An- terior Polo- mye- litis.		25A Chicken Pox.		10 Diph- theria.		24 Ep- cere- bro- spinal Menin- gitis.		25B Ger- man Mea- sles.		40 Gonor- rhea.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
76	Andover	10,387	2	1	30	-	7	1	-	-	15	-	3	-
77	Northbridge	10,045	1	1	11	-	8	1	-	-	1	-	1	-
78	Towns, 5,000-10,000.	352,933	11	6	842	8	204	5	9	1	747	-	177	-
79	North Attleborough	9,816	-	-	2	-	4	-	-	-	4	-	2	-
80	Athol	9,593	-	-	2	-	1	-	-	-	-	-	9	-
81	Bridgewater	9,517	-	-	48	-	6	-	-	-	13	-	6	-
82	Wellesley	9,183	3	-	46	-	23	-	-	-	35	-	4	-
83	Middleboro	9,168	-	-	113	-	18	-	-	-	67	-	2	-
84	Dartmouth	9,147	-	-	13	-	2	-	1	-	23	-	-	-
85	Stoneham	9,142	-	-	-	-	32	-	-	-	50	-	3	-
86	Needham	9,070	-	-	80	-	4	-	-	-	16	-	3	-
87	Swampscott	8,994	-	-	43	-	3	-	2	1	4	-	7	-
88	Ludlow	8,865	-	-	62	-	4	1	1	-	27	-	1	-
89	Reading	8,753	-	-	-	-	5	-	-	-	-	-	4	-
90	Ware	8,634	-	-	15	1	4	-	-	-	-	-	2	-
91	Marblehead	8,256	-	-	10	-	6	-	-	-	3	-	5	-
92	Hudson	8,155	1	1	3	-	-	-	-	-	-	-	1	-
93	Montague	7,987	-	1	3	-	2	-	-	-	1	-	6	-
94	Rockland	7,986	1	1	-	-	-	-	-	-	2	-	1	-
95	Stoughton	7,904	-	-	30	-	2	-	-	-	30	-	2	-
96	Maynard	7,894	-	-	-	-	-	-	-	-	-	-	1	-
97	Whitman	7,891	-	-	4	-	1	-	-	-	-	-	3	-
98	Lexington	7,853	-	-	13	-	11	2	-	-	75	-	2	-
99	Concord	7,084	-	-	58	-	-	-	1	-	109	-	66	-
100	Franklin	7,081	2	-	4	-	-	-	-	-	23	-	5	-
101	Grafton	6,977	-	-	-	-	-	-	-	-	-	-	1	-
102	North Andover	6,866	-	-	6	-	-	-	-	-	55	-	-	-
103	South Hadley	6,660	-	-	17	-	3	-	1	-	18	-	-	-
104	Chelmsford	6,615	1	-	3	-	2	-	-	-	6	-	-	-
105	Mansfield	6,606	-	-	39	-	-	-	-	-	1	-	2	-
106	Walpole	6,558	-	-	34	-	6	-	-	-	-	-	6	-
107	Spencer	6,551	-	-	4	-	3	-	-	-	5	-	2	-
108	Milbury	6,479	-	-	3	-	12	-	-	-	5	-	3	-
109	Dracut	6,453	-	-	-	-	1	-	-	-	-	-	-	-
110	Great Barrington	6,409	1	1	6	-	3	-	-	-	3	-	5	-
111	Westborough	6,374	-	-	19	-	1	-	-	-	1	-	8	-
112	Agawam	6,350	-	-	-	-	1	-	-	-	2	-	1	-
113	Uxbridge	6,210	-	-	20	-	3	-	-	-	-	-	-	-
114	Winchendon	6,186	-	-	2	-	1	1	-	-	3	-	-	-
115	Hingham	6,184	-	-	10	-	2	1	-	-	2	-	-	-
116	Ipswich	6,048	1	-	-	-	7	-	1	-	1	-	-	-
117	Amherst	5,992	-	-	8	-	5	-	-	-	39	-	-	-
118	Shrewsbury	5,920	-	1	1	-	4	-	-	-	-	-	2	-
119	Canton	5,894	-	-	39	-	8	1	-	-	38	-	-	-
120	Abington	5,887	-	-	-	-	-	-	-	-	-	-	2	-
121	Barnstable	5,818	1	1	55	-	6	-	1	-	55	-	4	-
122	Randolph	5,686	-	-	4	-	2	-	-	-	5	-	3	-
123	Wareham	5,650	-	-	-	-	5	-	-	-	-	-	1	-
124	Easton	5,347	-	-	23	-	1	-	-	-	8	-	1	-
125	Orange	5,129	-	-	-	-	-	-	-	-	-	-	-	-
126	Monson	5,101	-	-	2	-	-	-	-	-	-	-	-	-
127	Tewksbury	5,010	-	-	-	-	-	-	-	-	1	-	-	-
128	Towns, 2,500-5,000.	207,493	6	4	390	-	96	6	-	-	356	-	65	2
129	Auburn	4,976	-	-	22	-	9	-	-	-	-	-	1	-
130	Billerica	4,973	-	-	2	-	2	-	-	-	2	-	-	-
131	Foxborough	4,972	-	-	48	-	3	1	-	-	14	-	3	-
132	Somerset	4,880	-	-	3	-	5	-	-	-	-	-	1	-
133	Blackstone	4,826	-	-	-	-	-	-	-	-	-	-	1	-
134	Falmouth	4,751	-	-	5	-	5	-	-	-	5	-	-	-
135	Dudley	4,636	-	-	-	-	8	2	-	-	-	-	1	-
136	Templeton	4,385	-	-	22	-	-	-	-	-	50	-	1	-
137	Westport	4,259	1	-	4	-	1	1	-	-	6	-	-	-
138	Seckonk	4,253	1	2	-	-	-	-	-	-	-	-	-	-
139	Acushnet	4,185	-	-	3	-	-	-	-	-	7	-	-	-
140	Leicester	4,133	-	-	-	-	-	-	-	-	-	-	1	-
141	Dalton	4,108	1	-	-	-	-	-	-	-	-	-	-	-
142	Lee	4,057	-	-	-	-	2	-	-	-	-	-	1	-
143	Oxford	4,036	-	-	4	-	1	-	-	-	2	-	-	-
144	Williamstown	4,020	-	-	16	-	10	-	-	-	24	-	1	-
145	Warren	3,973	-	-	1	-	-	-	-	-	7	-	-	-
146	Rockport	3,952	-	-	7	-	1	-	-	-	-	-	2	-
147	Medfield	3,880	-	-	2	-	-	-	-	-	1	-	-	-
148	Provincetown	3,765	-	-	9	-	4	-	-	-	-	-	1	-
149	Westford	3,590	-	-	22	-	1	-	-	-	-	-	2	-
150	Wilmington	3,559	-	-	-	-	3	1	-	-	-	-	1	-

to the Public Health, 1925 — Continued.

11	101		7		13		40A		8		38		31, 37 37A, 37B		32-36E		1		9		Line No.	
Influenza.	Cases.	Deaths.	Lobar Pneumonia.	Cases.	Deaths.	Measles.	Cases.	Deaths.	Mumps.	Cases.	Deaths.	Syphilis.	Cases.	Deaths.	Tuberculosis, Pulmonary.	Cases.	Deaths.	Typhoid Fever.	Cases.	Deaths.		Whooping Cough.
29	1	11	7	2	162	-	-	-	29	1	-	3	-	8	4	2	1	-	-	95	-	76
4	1	7	6	1	17	-	-	-	1	-	15	-	-	6	2	-	-	-	-	7	-	77
58	54	206	136	1497	11	369	-	26	589	6	161	5	300	150	18	37	38	3	734	17	-	78
2	4	2	3	9	-	-	-	1	9	1	1	-	-	12	3	1	2	-	-	14	-	79
-	7	-	5	3	-	-	-	-	9	1	1	-	-	3	1	-	-	-	-	-	-	80
-	-	-	21	8	13	-	-	1	40	-	74	1	51	7	3	1	1	-	-	19	-	81
-	-	-	4	2	31	35	-	1	20	-	1	2	7	3	3	1	4	-	-	20	-	82
-	-	-	5	1	7	-	-	-	11	-	-	-	5	5	3	1	2	-	-	19	-	83
1	1	14	8	143	1	11	-	2	8	1	-	-	8	7	7	2	2	1	54	-	84	
2	2	3	2	9	-	105	-	1	6	-	1	-	12	3	3	1	1	-	31	2	85	
2	2	8	4	24	-	37	-	2	43	-	1	-	3	3	-	-	1	1	17	-	86	
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-	-	1	1	3	145	-	-	-	9	-	1	1	17	3	-	-	-	-	18	-	88	
-	-	-	7	5	1	-	-	-	1	-	1	-	3	4	-	-	-	-	2	-	89	
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-	-	6	3	1	-	143	-	1	3	-	-	-	6	2	-	-	2	-	-	-	-	96
16	11	19	3	19	-	3	-	2	15	-	24	-	1	6	3	1	1	1	48	1	-	97
8	6	4	3	19	-	3	-	-	21	-	-	1	6	3	1	1	1	1	45	-	-	98
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-	-	1	1	10	1	-	-	-	6	-	-	-	3	1	-	4	-	-	-	-	-	107
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5	1	-	7	19	-	-	-	-	16	-	28	-	6	7	-	1	-	-	2	-	-	109
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-	-	1	-	18	-	-	-	-	7	-	-	-	10	1	-	-	-	-	-	-	-	123
-	-	-	2	3	26	1	-	-	1	-	-	-	-	3	-	-	-	-	-	2	-	124
62	37	97	104	1042	6	119	-	6	477	2	17	4	147	132	16	22	18	-	319	9	-	125
-	1	1	3	122	1	-	-	1	19	-	-	-	9	2	1	1	-	-	6	-	-	126
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-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	150

to the Public Health, 1925 — Continued.

11		101		7		13		40A		8		38		31, 37 37A, 37B		32-36E		1		9		Line No.
Influenza.		Lobar Pneumonia.		Measles.		Mumps.		Ophthalmia Neonatorum.		Scarlet Fever.		Syphilis.		Tuberculosis, Pulmonary.		Tuberculosis, Other Forms.		Typhoid Fever.		Whooping Cough.		
Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	
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2	-	7	2	37	3	3	-	-	-	2	-	-	-	3	1	-	1	-	-	15	-	158
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-	-	-	-	-	-	1	-	-	-	2	-	-	-	4	-	-	-	-	-	-	-	202
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-	-	-	-	2	-	-	-	-	-	1	-	-	-	1	1	-	-	-	-	-	-	204
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-	1	2	3	2	-	3	-	-	-	1	-	1	-	1	-	-	-	24	-	-	-	219
-	-	-	3	-	-	-	-	-	-	4	-	-	1	3	1	-	-	-	-	6	-	220
-	-	1	1	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	221
-	-	2	3	25	1	18	-	-	-	8	-	-	-	2	1	-	1	-	-	-	-	222
-	-	-	15	-	-	-	-	-	-	2	-	-	-	1	-	-	-	-	-	-	-	223
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	224

Cases and Deaths from Diseases Dangerous

Line No.	CITIES AND TOWNS GROUPED IN ORDER OF POPULATION.	Popu- lation esti- mated as of July 1, 1925.	22		25A		10		24		25B		40	
			An- terior Poli- mye- litis.		Chicken Pox.		Diph- theria.		Ep. Cere- bro- spinal Menin- gitis.		Ger- man Mea- sles.		Gonor- rhea.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
226	Westwood	1,723	-	-	1	-	1	1	-	-	-	-	-	-
227	North Reading	1,708	-	-	-	-	-	-	-	-	-	-	-	-
228	Duxbury	1,695	-	-	5	-	1	-	-	-	-	-	1	-
229	Middleton	1,689	-	-	-	-	-	-	-	-	-	-	-	-
230	Freetown	1,669	-	-	-	-	-	-	-	-	-	-	-	-
231	Nahant	1,645	-	-	1	-	1	-	-	-	-	-	-	-
232	Sheffield	1,622	-	-	1	-	-	-	-	-	-	-	-	-
233	Mattapoisett	1,569	-	-	31	-	-	-	-	-	36	-	-	-
234	Buckland	1,561	-	-	-	-	3	-	-	-	-	-	1	-
235	Colrain	1,560	1	-	-	-	-	-	-	-	-	-	-	-
236	Huntington	1,548	-	-	-	-	-	-	-	-	-	-	-	-
237	Yarmouth	1,546	-	-	-	-	-	-	-	-	1	-	-	-
238	Shelburne	1,543	-	-	1	-	-	-	-	-	6	-	-	-
239	Sterling	1,526	-	-	4	-	1	-	-	-	17	-	1	-
240	Chester	1,524	-	-	-	-	24	2	-	-	-	-	-	-
241	Bedford	1,521	-	-	6	-	-	-	-	-	-	-	-	-
242	Plainville	1,519	1	-	-	-	-	-	1	-	-	-	-	-
243	Pembroke	1,486	-	-	-	-	-	-	-	-	-	-	-	-
244	Sandwich	1,480	-	-	2	-	1	-	-	-	21	-	-	-
245	Norwell	1,471	-	-	-	-	-	-	-	-	3	-	4	-
246	Burlington	1,457	-	-	1	-	4	1	-	-	4	-	-	-
247	Lakeville	1,440	-	-	1	-	-	-	-	-	11	-	-	-
248	Newbury	1,438	-	-	2	-	1	-	-	-	-	-	-	-
249	Tisbury	1,438	-	-	19	-	-	-	-	-	1	-	-	-
250	Littleton	1,417	-	-	4	-	1	-	-	-	-	-	-	-
251	Rowley	1,416	-	-	1	-	-	-	-	-	1	-	-	-
252	Sudbury	1,407	-	-	-	-	-	-	-	-	-	-	4	-
253	Russell	1,406	-	-	-	-	-	-	-	-	-	-	-	-
254	Brookfield	1,405	-	-	1	-	-	-	-	-	1	-	1	-
255	Essex	1,400	-	-	-	-	-	-	-	-	-	-	1	-
256	Lynnfield	1,339	-	-	-	-	-	-	-	-	-	-	-	-
257	Erving	1,336	-	-	1	-	1	-	-	-	3	-	-	-
258	West Newbury	1,330	-	-	-	-	-	-	-	-	-	-	-	-
259	Oak Bluffs	1,327	-	-	-	-	-	-	-	-	16	-	-	-
260	Carver	1,326	-	-	-	-	-	-	-	-	-	-	1	-
261	Lincoln	1,318	-	-	1	-	3	-	-	-	3	-	-	-
262	West Brookfield	1,316	-	-	51	-	-	-	-	-	12	-	1	-
263	Sunderland	1,290	-	-	-	-	-	-	-	-	-	-	-	-
264	Marion	1,270	-	-	-	-	-	-	-	-	45	-	-	-
265	Southwick	1,270	-	-	-	-	-	-	-	-	-	-	-	-
266	Edgartown	1,237	-	-	-	-	-	-	-	-	-	-	-	-
267	Whately	1,229	-	-	-	-	-	-	-	-	-	-	-	-
268	Clarksburg	1,226	-	-	1	-	2	-	-	-	1	-	-	-
269	West Stockbridge	1,219	-	-	-	-	-	-	-	-	-	-	-	-
270	Norfolk	1,215	-	-	-	-	1	-	-	-	-	-	-	-
271	Stow	1,189	-	-	-	-	-	-	-	-	-	-	-	-
272	Lanesboro	1,187	-	-	-	-	-	-	-	-	-	-	-	-
273	Wenham	1,147	-	1	-	-	-	-	-	-	-	-	-	-
274	Berkley	1,127	-	-	-	-	-	-	-	-	-	-	-	-
275	Tyngsborough	1,110	-	-	-	-	-	-	-	-	4	-	1	-
276	Rochester	1,102	-	-	-	-	-	-	-	-	1	-	-	-
277	Berlin	1,081	-	-	-	-	-	-	-	-	-	-	-	-
278	Orleans	1,081	-	-	20	-	-	-	-	-	-	-	-	-
279	Hubbardston	1,068	-	-	-	-	1	-	-	-	-	-	-	-
280	Dover	1,052	1	-	8	-	1	-	-	-	1	-	-	-
281	Hinsdale	1,043	-	-	-	-	-	-	-	-	-	-	1	-
282	Mendon	1,033	-	-	-	-	-	-	-	-	-	-	-	-
283	New Marlborough	990	-	-	16	-	-	-	-	-	-	-	-	-
284	Boylston	978	-	-	-	-	-	-	-	-	-	-	-	-
285	Conway	930	-	-	-	-	-	-	-	-	-	-	-	-
286	East Brookfield	930	-	-	-	-	-	-	-	-	-	-	-	-
287	Harvard	922	-	-	-	-	-	-	-	-	-	-	-	-
288	Ashfield	921	-	-	7	-	-	-	-	-	2	-	-	-
289	Southampton	921	-	-	-	-	-	-	-	-	1	-	-	-
290	Gill	920	-	-	1	-	-	-	-	-	1	-	-	-
291	Topsfield	916	-	-	-	-	-	-	-	-	-	-	1	-
292	Ashby	910	-	-	-	-	-	-	-	-	-	-	-	-
293	Sherborn	899	-	-	1	-	-	-	-	-	3	-	-	-
294	Bernardston	847	-	-	-	-	-	-	-	-	-	-	-	-
295	Brimfield	843	-	-	-	-	-	-	-	-	-	-	-	-
296	Royalston	821	-	-	-	-	-	-	-	-	-	-	-	-
297	Charlemont	820	-	-	-	-	-	-	-	-	-	-	-	-
298	Granby	811	-	-	-	-	-	-	-	-	-	-	-	-
299	Bolton	805	-	-	-	-	-	-	-	-	1	-	-	-
300	Wellfleet	784	-	-	-	-	13	-	-	-	-	-	-	-

11		101		7		13		40A		8		38		31, 37 37A, 37B		32-36E		1		9		Line No.
Influenza.		Lobar Pneumonia.		Measles.		Mumps.		Ophthalmia Neonatorum.		Scarlet Fever.		Syphilis.		Tuberculosis, Pulmonary.		Tuberculosis, Other Forms.		Typhoid Fever.		Whooping Cough.		
Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	
-	-	3	-	20	-	-	-	-	-	3	-	-	-	1	-	-	-	-	-	3	-	226
-	-	-	-	34	-	-	-	-	-	1	-	-	-	21	-	-	-	-	-	-	-	227
-	-	-	-	3	-	15	-	-	-	2	-	-	-	-	-	-	-	-	-	6	-	228
-	-	1	-	2	-	-	-	-	-	1	-	12	-	-	-	-	-	-	-	-	-	229
-	-	-	-	3	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	230
-	-	1	-	-	-	3	-	-	-	3	-	1	-	2	-	-	-	-	-	4	-	231
-	-	3	-	-	-	2	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	232
-	-	-	-	-	-	-	-	47	-	2	-	-	-	2	-	-	-	-	-	1	-	233
-	-	-	-	2	-	-	-	-	-	4	-	1	-	1	-	-	-	-	-	-	-	234
-	-	-	-	1	-	-	-	-	-	2	-	-	-	1	-	-	-	-	-	-	-	235
-	-	1	-	3	-	-	-	-	-	1	-	-	-	3	-	-	-	-	-	-	-	236
-	-	1	1	-	-	-	-	2	-	6	-	-	-	-	-	1	-	1	1	2	-	237
-	-	-	-	4	-	-	-	-	-	6	-	-	-	-	-	-	-	-	-	-	-	238
-	-	1	-	4	-	-	-	-	-	1	-	-	-	2	-	-	-	-	-	3	-	239
-	-	2	-	10	-	5	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	240
-	-	-	-	2	-	3	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	241
-	-	1	-	1	-	-	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	242
-	-	-	-	2	-	-	-	-	-	1	-	-	-	2	-	-	-	-	-	-	-	243
-	-	1	-	2	-	2	-	-	-	2	-	-	-	4	-	-	-	-	-	-	-	244
-	-	-	-	27	-	2	-	-	-	6	-	1	-	1	-	1	-	-	-	-	-	245
-	-	-	-	3	-	-	-	-	-	1	-	-	-	17	-	40	-	-	-	-	-	246
-	-	-	-	1	-	-	-	-	-	5	-	-	-	-	-	1	-	-	-	-	-	247
-	-	2	-	1	-	-	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	248
-	-	1	-	1	-	26	-	7	-	2	-	-	-	1	-	-	-	1	-	-	-	249
-	-	-	-	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	250
-	-	1	-	1	-	-	-	-	-	2	-	-	-	1	-	-	-	-	-	-	-	251
-	-	-	-	1	-	-	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	252
-	-	1	-	13	-	-	-	-	-	1	-	-	-	1	-	-	-	-	-	1	-	253
-	-	1	-																			

to the Public Health, 1925 — Concluded.

11		101		7		13		40A		8		38		31, 37 37A, 37B		32-36E		1		9		Line No.
Influenza.		Lobar Pneumonia.		Measles.		Mumps.		Ophthalmia Neonatorum.		Scarlet Fever.		Syphilis.		Tuberculosis, Pulmonary.		Tuberculosis, Other Forms.		Typhoid Fever.		Whooping Cough.		
Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	
-	-	-	-	4	1	51	-	1	-	-	-	-	-	1	-	-	-	-	-	2	-	301
-	-	-	1	1	4	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	302
-	-	1	-	30	6	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	303
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	304
-	-	-	-	-	2	-	-	-	-	6	-	-	-	1	-	-	-	-	-	-	-	305
-	-	-	-	-	-	-	-	-	-	5	-	-	-	-	-	-	-	-	-	-	-	306
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	307
-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	308
-	-	-	-	-	-	-	-	-	-	3	-	-	-	3	1	-	-	-	-	1	8	309
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	310
-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	311
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	312
-	-	-	1	-	1	1	-	-	-	3	-	-	-	-	-	-	-	-	-	1	-	313
-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	314
-	-	-	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	315
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	316
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	317
-	-	-	-	4	1	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	318
1	1	-	-	-	-	2	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	319
-	-	-	-	1	-	1	-	-	-	4	-	-	-	3	3	-	-	-	-	-	-	320
-	-	-	-	2	-	-	-	-	-	3	-	-	-	1	1	-	-	-	-	-	-	321
-	-	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	322
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-	-	-	-	7	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	334
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1	-	-	1	3	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	355
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	-	356
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	357
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	358
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	359
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	360
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	361
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	362
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	363
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	364
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	365
12	-	7	20	7	-	-	-	-	-	2	-	3	6	129	114	12	7	9	-	27	4	366

In addition to the above there occurred 3 cases of actinomycosis with 1 death:

	Cases.	Deaths.
Boston	1	1
Cambridge	1	-
Somerville	1	-

5 cases anthrax with 1 death:

Haverhill	1	1
Lynn	3	-
Woburn	1	-

186 cases dog bite:

Amesbury	1	-
Arlington	3	-
Becket	1	-
Belmont	2	-
Beverly	4	-
Billerica	11	-
Bolton	2	-
Boston	22	-
Chelmsford	1	-
Chelsea	1	-
Clinton	3	-
Everett	2	-
Fall River	2	-
Holyoke	1	-
Hudson	3	-
Lawrence	1	-
Lynn	1	-
Lowell	49	-
Medfield	1	-
Medford	1	-
Milton	1	-
Newton	6	-
North Attleborough	6	-
Northampton	7	-
Peabody	10	-
Revere	11	-
Somerville	2	-
Stoneham	2	-
Watertown	9	-
Wellesley	3	-
West Brookfield	2	-
Weston	1	-
Winchester	2	-
Winthrop	5	-
Worcester	7	-

13 cases dysentery with 6 deaths:

Boston	7	5
Cambridge	1	-
Chelsea	1	-
Medford	1	-
Millbury	-	1
Peabody	1	-
Shirley	1	-
Weymouth	1	-

146 cases encephalitis lethargica with 96 deaths:

Amherst	1	-
Arlington	1	-
Attleboro	2	1
Belmont	1	-
Beverly	3	2
Boston	40	31
Bridgewater	1	1
Brockton	3	2
Brookline	2	2
Cambridge	4	-
Chelsea	1	-
Clinton	1	1
Dedham	1	-
Everett	2	-
Fall River	7	6
Franklin	1	1
Gardner	1	-
Gloucester	-	1
Greenfield	-	1
Haverhill	7	3
Leominster	1	1
Lowell	2	2
Lynn	3	1
Malden	3	2

	Cases.	Deaths.
Mansfield	1	1
Medford	3	-
Merrimac	1	-
Methuen	2	2
Milton	-	1
New Bedford	1	-
Newburyport	2	-
Newton	3	-
Northampton	9	6
Norwood	1	-
Oxford	1	-
Peabody	1	1
Pittsfield	1	2
Quincy	1	-
Revere	1	2
Rockland	1	-
Salem	2	3
Somerset	1	1
Somerville	-	1
Springfield	8	6
Swampscott	1	-
Taunton	1	1
Tewksbury	-	1
Tewksbury State Infirmary	1	-
Tisbury	-	1
Uxbridge	1	-
Waltham	2	-
Webster	1	1
Wellesley	-	1
Winchendon	-	1
Woburn	-	1
Worcester	11	5

547 cases hilum tuberculosis:

Adams	11	-
Amherst	2	-
Arlington	18	-
Attleboro	10	-
Avon	1	-
Beverly	14	-
Boston	1	-
Brockton	3	-
Brookline	1	-
Canton	2	-
Chicopee	21	-
Clinton	3	-
Easthampton	12	-
Easton	1	-
Everett	2	-
Fall River	105	-
Gardner	1	-
Gloucester	4	-
Haverhill	3	-
Holden	1	-
Holyoke	15	-
Lawrence	42	-
Lee	4	-
Lowell	3	-
Lynn	1	-
Malden	32	-
Mattapoisett	4	-
Maynard	5	-
Medfield	1	-
Medford	2	-
Methuen	18	-
Middleborough	1	-
Milford	1	-
New Bedford	70	-
Newton	5	-
Northampton	18	-
North Adams	19	-
Norwood	1	-
Palmer	1	-
Peabody	1	-
Pepperell	4	-
Plymouth	6	-
Randolph	2	-
South Hadley	2	-
Springfield	45	-
Stoneham	1	-
Sturbridge	1	-
Uxbridge	3	-
Wakefield	1	-
Walpole	10	-
Watertown	9	-
Wayland	2	-
West Springfield	1	-

23 cases hookworm:	Cases.	Deaths.
Boston	20	-
Clinton	1	-
Rockport	1	-
Winthrop	1	-

11 cases malaria with 6 deaths:	Cases.	Deaths.
Boston	4	1
Brookline	1	-
Cambridge	1	-
Gardner	-	1
Gloucester	-	1
Hopedale	-	1
Lowell	1	1
Medford	1	-
Northbridge	1	-
Springfield	-	1
Woburn	2	-

19 cases pellagra with 10 deaths:	Cases.	Deaths.
Arlington	1	-
Boston	10	3
Brookton	1	-
Danvers	2	4
Pittsfield	1	1
Springfield	2	1
Waltham	1	-
Ware	-	1
Worcester	1	-

116 cases septic sore throat with 29 deaths:	Cases.	Deaths.
Amherst	1	-
Ashland	1	-
Belmont	1	-
Beverly	3	-
Boston	65	14
Brookline	3	-
Cambridge	5	-
Fall River	3	-
Fitchburg	2	-
Framingham	1	-
Haverhill	2	-
Holyoke	1	1
Hubbardston	1	1
Ipswich	2	-
Lawrence	1	1
Lowell	1	1
Ludlow	-	1
Lynn	-	1
Marion	1	-
Marblehead	3	-
Medford	2	-
New Bedford	2	1
Newton	1	-
Peabody	2	1
Revere	1	-
Salem	-	1
Somerville	3	2
South Hadley	1	1
Springfield	-	1
Swampscott	-	1
Taunton	1	-
Westfield	1	-
Whitman	1	-
Winchester	1	-
Winthrop	1	-
Worcester	2	1

3 cases smallpox:	Cases.	Deaths.
Medford	1	-
North Attleborough	1	-
Tisbury	1	-

45 cases tetanus with 33 deaths:	Cases.	Deaths.
Beverly	2	2
Boston	20	8
Brookline	-	1
Chelsea	1	1
Dudley	1	-
Easthampton	-	1
Everett	1	-
Haverhill	2	1
Lawrence	1	1
Lenox	1	-
Lowell	1	1
Lynn	1	2
Malden	-	1
Methuen	1	-
Milford	-	1
North Bedford	5	5
Pittsfield	1	2
Quincy	2	2
Salem	1	1
Springfield	1	1
Worcester	3	2

75 cases trachoma:	Cases.	Deaths.
Boston	45	-
Braintree	1	-
Brookton	3	-
Cambridge	4	-
Chelsea	1	-
Fall River	1	-
Haverhill	1	-
Lancaster	1	-
Lawrence	2	-
Lowell	3	-
Lynn	1	-
Malden	1	-
Medford	2	-
Milford	1	-
Plymouth	3	-
Springfield	1	-
Tisbury	1	-
Watertown	1	-
West Springfield	1	-
Worcester	2	-

26 cases trichinosis:	Cases.	Deaths.
Ashland	1	-
Boston	17	-
Cambridge	1	-
Everett	1	-
Sharon	5	-
Worcester	1	-

2 cases rabies with 3 deaths:	Cases.	Deaths.
Arlington	-	1
Chicopee	1	-
Holyoke	1	1
Springfield	-	1

2 cases Typhus:	Cases.	Deaths.
Boston	1	-
Winthrop	1	-

REPORT OF DIVISION OF BIOLOGIC LABORATORIES.

BENJAMIN WHITE, Ph.D., *Director.*
 ELLIOTT S. ROBINSON, M.D., *Assistant Director.*
 WILLIAM A. HINTON, M.D., *Assistant Director.*

I. ANTITOXIN AND VACCINE LABORATORY.

1. *Distribution of Products.*

The following table shows the amounts of the various products distributed each year for the past five years.

PRODUCT.	1921.	1922.	1923.	1924.	1925.
Diphtheria Antitoxin, 1,000 unit doses . . .	261,024	336,730	411,507	442,905	370,412
Antimeningococcic serum, 15 cc. doses . . .	3,444	4,296	4,609	3,949	3,262
Antipneumococcic serum, 100 cc. doses . . .	649	721	336	335	256
Antipneumococcic serum, bulk cc.	—	—	—	—	278,600
Smallpox Vaccine Virus, capillary tubes . . .	197,733	189,215	197,767	249,090	273,153
Typhoid-Paratyphoid Vaccine, 1 cc. doses . .	55,804	66,959	60,976	65,512	90,776
Schick Outfits, 50 doses each	547	3,235	5,875	6,427	5,403
Diphtheria toxin (bulk) cc.	32	155½	170	140	515
Diphtheria Toxin-Antitoxin Mixture, 1 cc. doses	9,414	96,407	174,589	309,294	171,405
Scarlet Fever Streptococcus Antitoxin, doses .	—	—	—	—	319
Normal Serum, cc.	9,788	4,665	7,670	39,415	20,290

(1) The decrease in the amount of diphtheria antitoxin distributed is due to the decreased incidence of this disease. When compared to the distribution for 1922, however, it is evident that the distribution on a basis of units per case has markedly increased.

(2) The number of bottles of antimeningococcic serum distributed is the smallest in five years. The state has been particularly free from this disease and, therefore, there has been less call for this product.

(3) While the number of bottles of antipneumococcic serum sent out is the smallest in five years, the amount of this serum distributed in bulk more than compensates for the decrease. Some of this bulk serum is being sent to Dr. Felton for concentration, and his concentrated antibody solution is supplied by him to hospitals, which otherwise would have used the unconcentrated serum.

(4) The 1925 distribution of smallpox vaccine virus shows a record amount. This is undoubtedly due to the increased prevalence and severity of smallpox in other parts of the country, and to the activities of such organizations as the Boston Chamber of Commerce in advocating vaccination against smallpox.

(5) The amount of typhoid-paratyphoid vaccine distributed has been exceeded only once in the history of the laboratory. That was in 1917 when there was an unusual demand for vaccine for the immunization of state troops.

(6) While the actual number of Schick outfits distributed is approximately 1,000 less than last year, this is partially compensated for by the use of bulk toxin by some hospitals.

(7) 1924 represented the inauguration of a diphtheria prevention campaign in many schools throughout the state. With the completion of the immunization of many school children of all ages, the procedure in these instances is now applied only to entering classes, resulting in a decreased demand for this product.

(8) Scarlet fever streptococcus antitoxin was added during 1925 and its distribution began on October 14.

2. *Expenses.*

The cost of operating this laboratory is shown in the accompanying table for a five year period.

YEAR.	PERSONAL SERVICES.		EXPENSES.	
	Appropriation.	Spent.	Appropriation.	Spent.
1921	\$28,760.00	\$28,610.41	\$24,700.00	\$24,500.46
1922	30,700.00	30,690.50	29,400.00	29,360.80
1923	35,620.00	35,229.51	30,002.56	30,001.73
1924	41,000.00	40,719.18	34,011.50	33,974.03
1925	43,200.00	42,507.56	34,648.52	33,982.92

There are several points in this connection which deserve brief mention. The expenditures on the expense account were practically the same for 1924 and 1925. If we deduct from the 1925 account the cost of several large pieces of expensive apparatus and include the expenses necessitated by the production of scarlet fever antitoxin, it will be seen that in spite of the large production of the laboratory, the actual expenses are considerably less than those for 1924. This economy is in part due to better bargaining in the purchase of supplies. The total expense for the operation of this laboratory, when compared to the volume of products distributed shows that the state is producing its products at a remarkably low cost. Furthermore, the distribution figures do not include the large reserve stocks of various products that have been prepared during the year.

The amount spent for personal services in 1925 is approximately \$700 less than the amount appropriated. This unexpended balance was caused by the failure to receive the salary increases requested.

3. *Stocks on Hand.*

This laboratory is now in a position to supply within reasonable limits the demands arising in epidemic emergencies. We have ample supplies of all products on hand, with the exception of scarlet fever streptococcus antitoxin. Owing to the limited accommodations for horses, it is as yet impossible to prepare enough of this product to meet current demands.

4. *Improvements.*

All rooms in the stable building have been painted, and the lighting has been bettered by the installation of new electric lights. An electric vacuum grooming apparatus has been installed, and the comfort of the horses has been increased by the installation of electric fans throughout the two stable buildings. One of the greatest improvements has been the installation of electric bake ovens for sterilizing glassware. This apparatus has done away with the fire and explosion risks connected with gas sterilizers, and the apparatus as installed makes possible a more reliable control of the sterilizing processes. Two ice refrigerators have been replaced by electric refrigerators, which not only enable us to keep the more perishable products at a more suitable temperature, but have decreased one item of labor in the preparation of smallpox vaccine virus.

5. *Personnel.*

While there have been the inevitable resignations and dismissals, in nearly every case, by offering a slightly higher salary, we have been able to secure a better type of employee. The staff as it now exists is an excellent one, but we can not expect to hold some of its members unless larger salaries are paid to them.

6. *Educational Activities.*

(a) *Teaching.* — The laboratory has continued as a place of instruction not only to students intending to take up the manufacture of biologic products, but also to those studying to become health officers and physicians. During the past year this laboratory has co-operated with the Department of Biology of Simmons College in giving a course intended for the training of workers in public health laboratories. This work is being continued because it is felt that the laboratory in this way can render a valuable service in supplying public health laboratories with well trained bacteriologists and serologists. Graduate students from the Harvard Medical School have been received not only for courses of instruction, but also for training in investigative work, and two courses have been given to students from the Harvard School of Public Health. Several Fellows of the International Health Board of the Rockefeller Foundation have spent varying periods in the laboratory studying the details of the manufacture of biologic products. Demonstrations of the various processes carried on in the laboratory have been given to classes of medical students from the medical schools of Harvard, Tufts and Boston University. Similar demonstrations have been given to classes of nurses from Simmons College and from various hospital training schools.

(b) *Investigation.* — In addition to manufacturing serums and vaccines, this laboratory, if it is to fulfil its proper function, must also add to our knowledge of

the various aspects of immunity. Studies are being carried out on the active immunization of horses to diphtheria toxin, and with the co-operation of Dr. Zinsser and Dr. Felton of the Harvard Medical School, a study is being made of pneumococcus immunity. Studies are also being carried out on the nature and action of diphtheria toxin, including the Ramon flocculation test, the concentration of toxin and the conversion of toxin into toxoid. The question of vaccinia immunity is also being restudied. The action of low temperatures on toxin-antitoxin mixture is being further investigated and the results of this research will shortly come to publication.

(c) *Visitors*. — This laboratory is always open to visitors and each year sees an increase in the number of persons who come here either for specific information or who come because of their general interest either in state activities or in medical subjects.

(d) *Consultation*. — Correspondence is maintained with similar laboratories not only in this country but throughout the world. Many requests are received from these various laboratories for advice and directions. The laboratory also acts as a consultant to members of the medical profession throughout the state on questions relating to biologic therapy.

(e) *Lectures and Addresses*. — The Director and the Assistant Director, in addition to lectures given to students in the Harvard School of Medicine and the School of Public Health, have addressed meetings of physicians, health officers, nurses and the public. The total audiences in these lectures, exclusive of the college lectures numbered 1,364.

(f) *Publications*. — The following publication was issued from the laboratory during 1925:

White, Benjamin: Vaccination against Smallpox, Its Technic and Interpretation. Boston Med. and Surg. J., Vol. 193, No. 5, pp. 210-212, July 30, 1925.

This article and an article by Dr. Hooker on The Skin Test for Immunity to Smallpox appearing in the same Journal were reprinted, and a copy sent to each physician in the state. These articles have aroused considerable interest, and the method of vaccination recommended is rapidly replacing the less satisfactory methods formerly used.

7. Inspection by U. S. Public Health Service.

Dr. Harrison of the U. S. Public Health Service made his annual inspection of the laboratory. As a result of his inspection the license covering the manufacture of biologic products prepared by this laboratory has been continued for another year. A license to prepare scarlet fever streptococcus antitoxin was issued to this laboratory during the past year.

II. WASSERMANN LABORATORY.

The routine activities of the Wassermann Laboratory continue to increase as is shown by Table I below, which gives the number and character of the examinations for the past five years:

TABLE I.

	1921.	1922.	1923.	1924.	1925.
Wassermann Tests	42,679	47,488	56,214	60,534	62,695
Kahn Tests	—	—	—	2,554	2,729
Gonococcus Fixation Tests	1,703	1,476	1,542	1,661	1,903
Lange's Colloidal Gold Tests	82	157	105	88	33
Complement Fixation Tests for Glanders	—	—	—	—	50
Diagnostic Examinations for the Division of Animal Industry:					
(a) Complement Fixation Tests for Glanders	125	279	145	110	42
(b) Examinations for Rabies	277	482	413	283	282
(c) Pathologic and Bacteriologic Examinations	50	55	34	34	37
(d) Agglutination tests for Bacillus abortus	—	—	—	148	89
	44,916	49,937	58,453	65,412	67,860

Beyond these strictly routine procedures a considerable amount of time has been spent in recataloguing 47,861 history cards in order that the abundant statistical data contained in these records can be utilized for publication. This work was

performed with the co-operation of the Department of Vital Statistics of the Harvard School of Public Health, under the direction of Professor Edwin B. Wilson.

In addition to the above activities, an investigation concerning the application of the complement fixation reaction to potency tests was carried out on the anti-meningococcic serum prepared by the Antitoxin and Vaccine Laboratory. As a result of this work, this laboratory now tests all lots of serum from this source for potency. In this connection, it should be pointed out that this work would have been impossible without the installation of an electric refrigerating apparatus. This apparatus because of the low temperatures which it affords makes it possible to keep the various delicate reagents preserved at their original strength for a considerable period of time, and this advantage also applies to the reagents used in all serologic examinations. The installation of this apparatus, therefore, has resulted not only in a maintenance of the potency of the various reagents but has also effected an economy in their use.

A study of the complement fixation reaction in tuberculosis has been continued. Although the work is not far enough advanced to permit the drawing of any definite conclusions, this investigation will be continued because of its importance not only in tuberculosis, but in its relation to the complement fixation reactions.

REPORT OF DIVISION OF HYGIENE.

MERRILL E. CHAMPION, M.D., *Director.*
MARY R. LAKEMAN, M.D., *Assistant Director.*

Education for health, like education of any other kind, is a long slow process. Year after year there must be repetition of the same general principles, a little progress towards the ultimate goal being noted each year. Accordingly, the activities of the Division of Hygiene during the past year have been largely an extension of the work of the year before.

Certain changes, however, should be recorded. The study of maternal deaths carried on in the field for two years was completed and prepared for publication. It has not seemed advisable to extend this study since in all probability the maximum amount of value has been obtained from it. Consequently, our staff has been reduced to meet this lessening of work. This has meant the loss of two physicians and corresponding clerical service. The cessation of this phase of our work has, however, through the release of part of the time of another physician, enabled us to extend our activities directed toward the pre-school child.

It is in order now to turn our attention to a more detailed statement regarding the various activities of the Division. These will be discussed under the headings of (a) Maternal and Infant Hygiene; (b) School Hygiene; (c) Nutrition; (d) Mouth Hygiene; (e) Health Education and Publicity; (f) Miscellaneous Activities (cancer).

MATERNAL AND INFANT HYGIENE.

Our objectives in maternal and infant hygiene are two-fold; (1) to discover the causes of maternal and infant mortality and morbidity and their prevention; and (2) the promotion of positive health for mothers and babies.

In the prosecution of the first objective, the study of maternal mortality already alluded to had its part. While the study brought out nothing startlingly new it, nevertheless, enabled us to feel surer of certain factors about which we had already more or less well-founded surmises. For example, it confirmed our belief that the summum bonum which we should hold before us is the dispelling of the ignorance of hygiene which prevents the average individual from taking advantage of the knowledge we already possess. This is not easily done, of course. Furthermore, it bore out the evidence which we previously had that poverty as a cause of maternal and infant mortality does not play the part which it was thought to play some years ago. There is no doubt but that we have a great deal yet to do to convince the average family that it pays to take maternal and infant hygiene much more seriously and that it is only reasonable health insurance to consult the family physician early in pregnancy in order that all possible sources of disaster be warded off. This, it will readily be seen, involves somewhat of a change in point of view on the part of many of the medical profession inasmuch as emphasis is shifted entirely from the treatment of the sick to the prevention of illness and maintenance of health.

Well-Child Conferences. — The past year has seen a healthy growth in our well-child conferences. These were held in 57 towns and included the examination of 2,172 children. A special study of 1,879 records showed that the percentage of defects found in these children examined reached to 79%.

It may be advisable to state at this point just what our well-child conferences are. They are conferences conducted in local communities by the staff of the Division of Hygiene assisted by the local public health nurse. A prerequisite for such a conference is a request from some public or private agency in the town and no conference is conducted without at least the good will of the local board of health. The purpose of these conferences is to demonstrate to the local public the need for health examinations of children of pre-school age and to demonstrate to them how such an examination may be obtained. The expectation is that after a demonstration has been conducted by the State the work will be taken over by some local agency. As a result of last year's demonstrations 11 towns have started local conferences with physicians in charge and 6 other towns a weighing and measuring conference with a nurse in charge.

The principle upon which the pre-school conference works is an important one. We have in Massachusetts a fairly complete system for supervising the health of the school child. In the course of this supervision many physical defects are found amongst school children which in reality should have been corrected long before the children entered school. If that had been done much time would have been saved and much money to the taxpayer. In this way the pre-school conferences tend to take the load off the school system. They, further, are efficacious in establishing health habits amongst children since they encourage the beginning of such health habits at the most impressionable age.

Our pre-school conferences complement our clinics for underweight school children, carried on by the Division of Tuberculosis. Ultimately adequate attention to the pre-school child ought to obviate the need of stressing so greatly the nutrition of the school child since more and more children will enter school adequately nourished and so, less likely to develop hilum tuberculosis.

Work of the Field Nurses. — Our four field nurses have followed the same general plan in their work as in previous years. Their first and most important function is to keep in touch with all local nurses carrying on any form of maternal and child hygiene work. These local nurses are visited at frequent intervals and made to feel that there is available from the Department sympathetic assistance in their problems. A considerable bit of information is thus available to the Department about the problems of the local community, which is of the greatest assistance in the general advisory work of the Department.

Frequent group conferences are held for local nurses at which outside speakers bring a fresh point of view and the latest technical information. These conferences also give opportunity for a free discussion on the part of the local nurses regarding their own particular problems. Plans which the Department has in mind of state-wide application are frequently brought to these local conferences for criticisms and suggestions.

The well-child demonstration conferences already referred to are worked up by our field nurses in conjunction with the local nurses. After the conference is over our nurses keep in touch with the local authorities with respect to the follow-up work so necessary if results are to be of the maximum value.

Special Activities. — Under the heading of special activities ought to be mentioned certain demonstrations on the value of breast feeding which are just beginning in certain cities and towns of the State. There is no question but that the importance of breast feeding in the prevention of infant mortality and morbidity has not been fully recognized by the general public or even by the medical profession. There is usually no reason for depriving any child of the advantage of natural feeding except under most unusual circumstances. The reason they are so deprived is because of the lack of realization of how essential breast milk is to the health of the young baby. Our breast feeding demonstrations are carried on largely by local visiting nurses with the advice and assistance of the Department. Their purpose is to reach, if possible, all new-born babies with a view to urging mothers to breast feed them for at least six months. A follow-up system is provided for so that it will be possible to tell exactly how many were reached in a given community and how long the breast feeding continued, as well as what the results were. It will be possible to give details as to our success in our next report.

SCHOOL HYGIENE.

Our school hygiene work differs from most of the other work of the Division of Hygiene in that it has as an additional incentive, the adequate enforcement of a state-wide law governing the medical supervision of the child in public schools. As a matter of fact, however, the methods by which results are obtained are precisely the same in this field as in any other since no amount of statutory authority is sufficient to make successful a plan of action which is not understood by the average citizen and which does not have his active support.

Our staff handling the school hygiene program is made up of a physician and two nurses. The chief function of these workers is to encourage a higher standard of school health work on the part of school physicians and nurses. To this end regular visits are made to these officials and to school superintendents. Group conferences are held where local problems are discussed in a manner similar to that

employed in the maternal and child hygiene conferences. In addition to the smaller group conferences there are larger ones held in conjunction with the State Department of Education. These have occurred annually now for several years and have proved to be of the greatest value. It is a pleasure to emphasize here the close and sympathetic co-operation which has existed ever since the beginning of this work between the Department of Education and the Department of Public Health.

Summer School at Hyannis. — An additional and far-reaching instance of this interdepartmental co-operation is seen in the Summer School conducted at first for school nurses and last year for school nurses and school teachers in conjunction with the regular Summer School at Hyannis. The Division of Hygiene detailed two workers to spend their whole time for six weeks teaching at the Normal School and in addition furnished several special lecturers. The Department of Education furnished two teachers who conducted courses through the whole term. The general facilities of the Summer School were also available to the students in these special sections. Courses were given in School Nursing Procedures, School Hygiene, Biology and Principles of Teaching Health. The enrollment was 65, consisting of 41 nurses, 20 teachers, and 4 oral hygienists. Preliminary certificates were granted to 23 students.

It seems inevitable that such a course as this conducted year after year will slowly but surely raise the standard of school nursing service in the State and will result in the establishment of a body of school teachers interested in health habit promotion and able to teach it to their pupils.

Further Activities. — During the past year the school hygiene group assisted in committee work on custodial care of schools, in goitre surveys, and in special lecturing and teaching.

NUTRITION.

The nutrition activities of the Division may be divided into two parts. The first of these has to do with our general advisory and teaching functions relating to the local communities; the second consists of furnishing nutrition service to the clinics for underweight children conducted by the Division of Tuberculosis of this Department.

General Advisory and Teaching Activities. — It is always a sound policy to use a small State staff to train local groups who in turn may reach large numbers of people. This policy, so far as nutrition is concerned, has led us to offer courses of lectures on nutrition to such groups as nurses and normal school pupils. In addition individual lectures have been given on many occasions to groups of nurses, teachers, social workers, and before such organizations as the Grange, Parent-Teacher Associations, Mothers' Clubs, Women's Clubs, and others. A course in dietetics was given last year, as in previous years, to the training school conducted by the Department at the Rutland Sanatorium.

At the request of the Commissioner of Correction, a study of diets was made in certain of the penal institutions and recommendations thereon made to him. Similar studies were made with respect to the diet in the Department's own tuberculosis institutions.

The preparation of new educational material, field visits to local communities, and many conferences with respect to local activities completed the first phase of our nutritional service.

Nutritionists with the Clinics for Underweight Children. — During the past year four nutritionists have been assigned for the most part to the tuberculosis clinics. It is the duty of these nutritionists to talk over with the children attending these clinics, and their mothers, the habits of living which have contributed to their lack of normal health. Their job then in reality is to find out what is in need of correction and so to impress the parents and the children that measures will be taken to correct the underlying errors. In addition each child receives printed material specially designed to assist the mother to carry out the directions offered at the clinic.

Much of the impetus furnished by the clinic will be lost if adequate follow-up work is not carried out. One nutrition worker is now being assigned to follow-up of all cases of positive and suspected tuberculosis to see that a continuing effort

is being made to remedy conditions. Even more important is the follow-up work for the child who is found not to have anything definite the matter with him excepting that he is underweight. These children, to be handled effectively, must be reached through the schools. This can mean only the installation of a systematic course of instruction in health habit promotion.

MOUTH HYGIENE.

During a large part of the past year we have been without a special mouth hygiene worker. This, of course, has resulted in a considerable diminution of activities since the calls have had to be met by other members of the staff. It is expected, however, that the vacancy in our staff will shortly be filled by a worker with a training different from that which has so far been given to dental hygienists. A mouth hygiene worker will be employed who will be also a trained nutrition worker. Modern ideas with respect to mouth hygiene lead us to believe that the greatest possible stress should be placed upon the importance of an adequate diet in the formation and preservation of good teeth. The knowledge that hygiene is of more importance than reparative work in the preservation of teeth has led to a radical change in our former method of handling the dental hygiene problem as a community matter.

Formerly it was considered sufficient to advise a community to start a dental clinic for the repair of the teeth of school children who were in need of such service. It was gradually realized, however, that this was an impossible proposition since practically every school child was in need of some sort of attention and so the administrative side of the problem was an overwhelming one. It was realized that reparative work alone could not be relied upon to solve the question of mouth hygiene. The dental hygienist then came on the scene to clean the children's teeth at regular intervals and to teach them the principles of hygiene as they had to do with the teeth. This educational side of the work is now realized to be by far the more important and it is an open question whether it should not be the only phase of mouth hygiene to be carried on under public auspices.

Much of the work of the Division of Hygiene, so far as mouth hygiene is concerned, has been giving advice to municipalities or private agencies in the local communities wishing to start some type of dental activity of their own. In the case of the public agency the advice now given is that they limit their activity largely to teaching mouth hygiene to the child, leaving the reparative work to the family dentist or to clinics conducted under private auspices. To private agencies wishing to carry on clinic work the advice is given that the clinics be made as nearly self-supporting as possible and that educational work be stressed even more than merely reparative work.

HEALTH EDUCATION.

It is difficult to discuss Health Education as a separate entity in the work of a Division like this since practically every move made by the Division has for its object the promotion of health education. The nutritionist stresses health education in terms of food, the mouth hygienist in terms of the care of the mouth and so on. Our school hygiene group has for one of its main functions the promotion of the teaching of hygiene in the schools.

Under the heading of health education, however, I shall discuss the activities of the special group in the Division whose function it is to make clear to the public in terms of written or pictorial representation the principles for which all the other special groups stand.

It may make for a better understanding of the health education and publicity work of the Division if it is taken up under various headings.

1. *Editorial Work.* — The Division of Hygiene edits the Department's quarterly bulletin, "The Commonhealth". This has been the Department's official organ for a great many years and apparently fills a distinct place of usefulness. Its message is directed towards those who are interested enough to serve as teachers of still larger groups. It goes to physicians, nurses, school teachers, special health workers of all kinds and to many laymen who have a special interest in health and the special opportunity to reach other people. During the past year "The Commonhealth" has included two special numbers, one dealing with Hygiene for the Middle

Aged and the other with Health Education. Other numbers have included articles on such subjects as prenatal care, skin infections in the public schools, mental hygiene in childhood, breast feeding, school hygiene and the health of the working child. A section on maternal and infant hygiene has been regularly carried in each issue.

2. *New Pamphlets.* — It is generally recognized that the best educational work is carried on by word of mouth through such teachers as the public health nurse. It is impossible, however, to reach all the public in that way. We must make use of all methods of education which can assist in any way. Amongst these methods is the intelligently written pamphlet. The old-fashioned pamphlet put out by a health department contained a great deal of sound, scientific information written in a manner so unattractive and in language so difficult to understand that it was practically useless as a means of informing the public. The Department is attempting to put out a different sort of pamphlet, one which carries its message in a few words and in an arresting manner. Amongst those presented during the past year are "Attention, Stand Tall", a pamphlet on posture; "Crossword Puzzle Book"; "Keeping Well"; "Cooking for Health"; "Handbook on Breast Feeding for Nurses"; popular flyers on breast feeding; "The Baby's First Teeth"; "Health Fun No. 2"; "Feeding the Preschool Child" and two plays presenting the subject of health in attractive, dramatic form for the use of children. A new type of activity has been the preparation of scenarios for use with delineascope films. These films are still pictures which take the place of stereopticon slides and make it possible for a lecturer to get across an illustrated health story.

3. *Poster Making.* — It has been found that there is great value in a well-planned and attractive poster especially for use in well child conferences, schools and other places. Good posters are not plentiful and ordinarily have to be prepared by hand with a specific object in view. A number of such posters have been made in the Division within the past year and loaned throughout the State.

4. *Exhibits.* — Since the founding of the Division in 1915 the conduct of health days and the use of exhibits has formed an important part of our work. Here again an evolution has taken place resulting in a greater diversification of exhibits and a greater attention to a specific object to be obtained. This year for example there was presented the Maypole of Health which was displayed at the Home Beautiful Exposition in Boston. It was also used with changes and additions at the Eastern States Exposition in Springfield.

Health shows were participated in by the Division of Hygiene in many cities and towns throughout the State. The total number shows an increase of forty-eight per cent over the number held last year. Some of these health shows were held in conjunction with a general health program in the schools, some in connection with well baby conferences and some held in connection with meetings of various organizations.

5. *Radio Talks.* — A large number of radio talks on personal health or special subjects was prepared during the past year. It has always been found advisable to use the radio in connection with the May Day celebration.

6. *May Day is Health Day.* — In 1925 as in the preceding year in conjunction with the American Child Health Association, May Day was celebrated in this State as child health day. The purpose of this celebration was to make use of the traditions centering around May Day to dramatize in the minds of the public the importance of attention to the health of the child. Active co-operation was had from the Department of Education whereby the physical education programs of the various schools throughout the State were utilized in May Day exercises. In connection with May Day a special play was prepared entitled "Crowning the Health Queen".

7. *Publicity.* — No department can be said to be carrying its message of health effectively to the public unless it utilizes every one of the well known means of public information. Chief among these is of course the newspapers. During the past year a brief, simple, pointed article has been sent to over two hundred newspapers in the State at weekly intervals. These have been well received and apparently can be counted upon to produce results. In addition to this general

service certain special services were offered to various local agencies in helping them to reach the public with their own special story.

The special health education activities of the Department may then be summed up by saying that they include the use of all the methods which we have found to be effective in getting to the public in concrete, understandable form the fund of information regarding child and adult hygiene which is possessed by special workers in these fields.

ACTIVITIES AGAINST CANCER AND OTHER DISEASES OF MIDDLE LIFE.

During the past year a diagnostic service has been maintained by the Department which offered to any physician in the State a pathological diagnosis in cases suspected of being cancerous. This service is given through the Harvard Cancer Commission and has been offered to physicians for a number of years. The response is increasingly great year by year. It is felt that this free diagnostic service not only offers important specific information to practicing physicians but serves also as an educational agency in impressing upon physicians and public alike the vital importance of early diagnosis and treatment of cancer. Written educational material is also distributed and probably will always prove to be of considerable value in informing people regarding cancer. It suffers under a considerable handicap, however, in that the average individual is repelled by the very thought of cancer and often is unwilling even to read about it. This makes it difficult to get newspaper discussion of the subject except at times when wonderful new cures for cancer are announced.

It is recognized that in the Division of Hygiene every effort should be made to acquaint the public with the importance of a proper hygienic life on the part of adults as well as of children. There is no question, however, but that the child forms our most hopeful point of attack. Almost any child can be taught to improve his health habits: relatively few adults see fit to change their unhygienic habits even though theoretically convinced that such a change is desirable. The Division, however, loses no opportunity to bring before groups of adults the principles and practice of hygiene.

REPORT OF DIVISION OF TUBERCULOSIS.

SUMNER H. REMICK, M.D., *Director.*

During the past year a large amount of time and effort has been spent in an attempt to systematize and co-ordinate the purchase of material and supplies, especially for the four State Sanatoria. Policies and procedure have been carefully developed along lines approved by the Commission on Administration and Finance and are apparently satisfactory to the Commission and to the Sanatoria.

The other important duties of the Division of Tuberculosis, namely, follow-up work, tuberculosis records and reports, tuberculosis dispensaries, ten-year program, subsidy and the building program, are requiring an ever increasing amount of time. In order that the Director may be able to give more time to some of these important duties and also to make more contacts with the increasing field work a medical assistant director is needed, which I earnestly recommend.

SANATORIA.

The four State Sanatoria, Rutland, Westfield, North Reading and Lakeville, have provided 335,266 days of treatment for 2,185 patients, with an average residence per patient of 278 days. This represents a decrease over our 1924 record of 44,010 days of treatment; 207 less patients were hospitalized and an average decrease of 32 days of treatment for each patient.

This unusual record of treating fewer patients and providing fewer hospital days of treatment is easily explained by the fact that the extensive additions and alterations at North Reading and Lakeville necessitated the closing of many wards and the transfer of patients to the county and municipal tuberculosis hospitals.

The gross weekly per capita cost is as follows: Rutland, \$15.76; Westfield, \$14.58; North Reading, \$17.92; Lakeville, \$26.15. The high per capita rate of Lakeville is explained by the fact that during the period of remodelling the institution for the care of extra-pulmonary tuberculosis cases few pulmonary cases could be hospitalized, making a very low daily average, while the overhead remained approximately the same as with the bed capacity filled.

It is most encouraging to report that we have had very few changes in our own staff during the past year. Dr. Minot W. Gale, assistant superintendent at the Lakeville State Sanatorium, resigned September 30, 1925, to accept a similar position at the Bristol County Tuberculosis Hospital. Dr. Harold B. Boyd was transferred from the North Reading State Sanatorium to Lakeville and promoted to the position of senior physician. Dr. William R. Martin, assistant physician at Lakeville, was transferred to Westfield for training in field work and is now a member of our clinic staff.

The superintendents of the four State Sanatoria are to be congratulated upon the extremely satisfactory management of their institutions during the past year, and the reader is requested to turn to their individual reports for more detailed information.

HOSPITALIZATION OF CHILDREN.

Additions to two wards at Westfield, mentioned in my report of last year, were completed in March. These additions have increased the capacity to 310 beds and provided much needed space for toilet, locker and recreation rooms. The demand for hospitalization of children has continued to such an extent that the Department early last year decided to increase the State's facilities by remodelling and enlarging three wards at the North Reading Sanatorium.

A special appropriation of \$57,000 was authorized by the Legislature for additions and alterations to Pavilion B, East and West, and Pavilion C. This work is well under way and it is expected that patients will be admitted in February or early March. These pavilions, after remodelling, will have a total capacity of 100 beds, to be used exclusively for the care and treatment of children. As the demand for hospitalization increases the entire institution of 215 beds will be made available for children only.

These two sanatoria, Westfield and North Reading, with a combined capacity

of 525 beds, both splendidly equipped and beautifully situated, one in the eastern and one in the western part of the state, will be the contribution of the Commonwealth to her children suffering from pulmonary and hilum tuberculosis.

NON-PULMONARY TUBERCULOSIS.

For a number of years the necessity of providing hospital facilities for the care and treatment of non-pulmonary cases in Massachusetts has been recognized. Since the mortality rate has been reduced fifty per cent in the last few years, the 3,600 beds provided by the State for the hospitalization of pulmonary cases, are more than the present need demands. Thus it seems logical to direct the use of extra beds to the service of this type of the disease, in the Commonwealth. After a very thorough investigation the Department recommended the remodelling of the Lakeville State Sanatorium for this purpose. The plan was approved by the General Court and under Chap. 510 of the Acts of 1924 authorized the Department to admit cases of non-pulmonary tuberculosis to Lakeville, and appropriated \$20,000 for the first expense of remodelling. The General Court in 1925 authorized a special appropriation of \$67,500 for the remodelling of the North Pavilion, Women's Ward and Administration building. Having decided to use the North Pavilion for the care and treatment of children, reconstruction work was started early in the spring. The first child was admitted on November 27, 1925. This building had ideal accommodation for fifty children on the first floor. The second floor provides twelve single rooms for employees.

The remodelling of the Women's Building is progressing satisfactorily and will probably be ready for the admission of patients some time in February. This change will provide 64 beds for women, and suites and single rooms for ten nurses on the second floor.

The basement of the administration building is being remodelled for extra dining rooms for the staff and a cafeteria for other employees. The second floor is being altered into suites of two, three and four rooms for the housing of the physicians and their families. An appropriation of \$40,000 is requested in our 1926 budget to remodel the Men's building. If granted, by the summer of 1926, the entire 200 beds at Lakeville will be available for the care and treatment of cases of non-pulmonary tuberculosis. To my knowledge this is the first State institution in this country devoted to the treatment of this type of tuberculosis for men, women and children. If this be true, Massachusetts again holds the honor of opening the first State institution for the treatment of all cases of non-pulmonary tuberculosis, as a decade ago she held the honor of opening the first State institution for the treatment of cases of pulmonary tuberculosis.

HOSPITALIZATION OF THE ADULT.

In line with the report of the Legislative Committee on State Administration on the tuberculosis situation in the Commonwealth, particularly hospitalization, and the laws passed by the legislature in 1924, the responsibility for the hospital care and treatment of the adult consumptive becomes a local problem. Cities of 100,000 population and over are now required to provide hospital facilities for all their tuberculous cases. The counties, through their boards of County Commissioners, are now required (Chap. 501, Acts 1924) to provide hospital facilities for all towns and cities under 100,000 population, either by building their own hospital or by contracting with a county or state institution, approved by the Department of Public Health. Six counties have built their own hospitals, *i.e.*, Bristol, Barnstable, Essex, Hampshire, Norfolk and Plymouth. The others have made contracts, *i.e.*, Berkshire, Dukes, Franklin, Hampden, Middlesex, Nantucket, Worcester, and that part of Suffolk County outside of Boston.

A brief summary of the hospitalization of the tuberculous in Massachusetts naturally falls under these headings — State, County and Municipal.

The State Sanatoria are to be used as follows: Westfield and North Reading to be reserved for children between the ages of 3 and 16 years needing sanatorium care for pulmonary and hilum tuberculosis. Lakeville will be used exclusively for the care and treatment of non-pulmonary tuberculosis. Rutland — about 250 beds will be reserved for patients admitted under our contracts with Middlesex, Worcester Counties, and Revere, Chelsea and Winthrop Tuberculosis Hospital

District. The remaining 100 beds will be available for early and favorable cases throughout the Commonwealth, preference being given to those able to pay their own board at the rate of \$7.00 per week.

TUBERCULOSIS DISPENSARIES.

The law now provides that all cities of 50,000 population or over shall maintain a dispensary; that towns under 50,000 may, and shall at the request of the Department of Public Health. During the past year the 56 dispensaries required and approved by the Department have as a whole been functioning very satisfactorily. The demand for this service is constantly increasing and the co-operation of the local dispensary with this Division is splendid and most encouraging.

CONSULTATION CLINICS.

The consultation clinics conducted by members of the staff of the four State Sanatoria once each month in sixteen (16) cities have been well patronized, with a few exceptions, and an increasing number of physicians have requested examinations for their patients. The records as given in the superintendents' reports show a decided increase in the number of cases being referred directly to the sanatoria, where laboratory and X-Ray facilities are quickly available. In a few cities the clinics have not been successful and after proper time and effort have been spent to acquaint local physicians with this service, if they do not then respond I would recommend that the same be discontinued and other localities served. At the request of the Framingham Board of Health a clinic has been opened this year which will serve Framingham and twelve nearby towns. The Health Department and the local physicians have worked together splendidly to make this clinic a success.

THE TEN-YEAR PROGRAM.

In my last annual report mention was made of the Department's plan for the inauguration of a systematic campaign for the prevention of tuberculosis by the examination of certain exposed and undernourished school children. This plan has been very carefully worked out to cover a period of ten years, and approved by the Legislature. The clinic group consists of twelve people: four experienced physicians, two nurses, three nutritionists, two stenographers and one X-Ray technician. In October 1924, in the city of Springfield, the first clinic work on the ten-year program was begun. At the request of the local Health and School Departments 10,648 Children have been examined in the following places: Acton, Acushnet, Amesbury, Arlington, Attleboro, Avon, Belmont, Beverly, Billerica, Bridgewater, Canton, Chelmsford, Dunstable, East Bridgewater, Everett, Fall River, Fairhaven, Foxboro, Gloucester, Hudson, Lawrence, Littleton, Malden, Mansfield, Mattapoisett, Maynard, Medway, Medfield, Merrimac, Methuen, Middleboro, Milford, New Bedford, Newton, North Andover, Norwood, Pepperell, Plainville, Plymouth, Randolph, Reading, Rehoboth, Salisbury, Somerset, Stoughton, Springfield, Swansea, Topsfield, Tyngsboro, Uxbridge, Wakefield, Ware, Wareham, Walpole, Watertown, Wayland, Westport, West Newbury, Wilmington.

	Total.	Per Cent.
Number examined	10,648	—
Contacts	1,612	15.138
Tuberculin tests made	10,016	94.06
Reactions to test	2,927	27.488
Tonsils and adenoids, advised	3,024	28.399
Dentistry advised	4,855	45.595
Pulmonary Tuberculosis cases	25	.29
Latent Pulmonary Tuberculosis cases	6	
Hilum Tuberculosis Cases	459	5.26
Latent Hilum Tuberculosis Cases	102	
Suspicious	1,114	10.462
Poor Posture	5,881	55.231
Heart Murmurs	168	.101

The percentages have not varied much from our preliminary survey and the examination of about 8,000 children four years prior to the establishment of the

clinic, and I believe that we may consider these figures a fair index of the amount of tuberculosis and other defects in the three classes of children examined, namely, all children 10% or more underweight, all contacts, or children who have been exposed to tuberculosis, and the so-called delicate child whose physical condition is considered unsatisfactory by the family or school physician. We have found that these three groups represent from 12 to 15% of the total primary and grammar school population.

The diagnosis of tuberculosis in children is based upon five major factors; symptoms, physical signs, tuberculin test, X-Ray, and elimination of other causes producing similar findings. By following this method I believe we can discover all the cases of tuberculosis that are in need of treatment, and that diagnosis made in this way can be defended from adverse criticism.

The Ten-Year Program has been enthusiastically received throughout the Commonwealth. Requests from Boards of Health and School Departments are constantly arriving. The clinic staff has been increased to seven physicians, four nurses, three nutritionists, two stenographers and one X-Ray technician. A follow-up unit has recently been organized and shows proof of enormous value. We now plan to re-examine every child who has been found positive or suspicious in the previous examination, and also any other previously examined whom the school physician or school nurse recommends for further observation. As previously mentioned, the Department has provided additional sanatorium facilities to care for children needing this type of treatment. It is expected that hundreds of children will be cared for in preventoria and summer camps provided by local organizations during the summer months.

SUBSIDY.

Chapter 111, Secs. 76-77 of the General Laws provides that under certain conditions cities and towns providing hospital care for cases of pulmonary tuberculosis in hospitals approved by this Department, are to be reimbursed by the Commonwealth at the rate of \$5.00 per week per patient. For the year ending November 30, 1925 there have been received 2,430 claims for subsidy from 90 cities and towns. Of this number 2,049 claims, amounting to \$217,170.30 were allowed.

The original purpose of the subsidy was to aid and encourage cities and counties to build local tuberculosis hospitals. So far as it is related to hospital construction the purpose of the subsidy would seem to have been attained. Recently the Legislature has placed the entire responsibility of hospitalization upon the local community, making tuberculosis, so far as hospitalization is concerned, a local and not a State problem. Believing that the subsidy law has accomplished its original purpose and is no longer necessary for the control of tuberculosis in this Commonwealth, I recommend the repeal of the above law.

RECOMMENDATIONS.

Westfield Sanatorium. — I would recommend an addition to the present school building consisting of three classrooms on the first floor, and accommodations for sixteen employees on the second floor. A carpenter shop should be constructed, and arrangements made for a fireproof office and record room, as submitted in the budget.

Rutland Sanatorium. — We need additional refrigeration, which necessitates an addition to the present building.

North Reading Sanatorium. — A school building with seven classrooms on the first floor. This is necessary to provide school facilities for children whom we will admit in the near future; and to provide adequate housing facilities for the present and future employees.

Lakeville Sanatorium. — We would strongly recommend the remodelling of the present men's building for the care and treatment of extra-pulmonary tuberculosis. This will complete the remodelling of this plant and carry out the provisions of Chapter 508 Acts of 1924.

LAKEVILLE STATE SANATORIUM.

RESIDENT OFFICERS.

LEON A. ALLEY, M.D., *Superintendent.*
 HAROLD B. BOYD, M.D., *Senior Physician.*
 HAROLD RAGOLSKY, M.D., *Assistant Physician.*
 Vacancy, *Assistant Physician.*
 CAROLINE T. WHITE, R.N., *Superintendent of Nurses.*
 SUSAN M. MURPHY, *Head Matron.*
 CHARLES J. ODENWELLER, *Steward.*
 ROBERT A. KENNEDY, *Chief Engineer.*
 THOMAS FRANCIS MAHONY, *Head Farmer.*

NON-RESIDENT OFFICER.

WILLIAM B. DAVIDSON, M.D., *Consulting Roentgenologist.*

REPORT OF THE SUPERINTENDENT.

TO GEORGE H. BIGELOW, M.D., *Commissioner, Department of Public Health.*

I have the honor to submit the sixteenth annual report of the Lakeville State Sanatorium, for the year ending Nov. 30, 1925. During the year there has been expended \$177,551.87 for maintenance, a gross weekly per capita cost of \$26.157. There has been collected from miscellaneous sources, (the total of all collections) \$56,105.82. Deducting this amount from the gross maintenance expense, leaves a net expense of \$121,446.05, and a net weekly per capita cost of \$17.891. There has been collected from private sources \$3,085.10, from Cities and Towns \$44,558.58, from the United States Veterans Bureau \$1,074.57, from the State Board of Retirement \$15.60, and from sales \$7,371.97. 34 patients were supported wholly or in part by private funds, 151 by Cities and Towns, 110 wholly by the State, 2 by the United States Veterans Bureau, and there are 41 patients on whom settlement has not been determined. When the reconstruction work was begun on the Women's and Children's Buildings, it necessitated the lowering of our capacity to 105 beds, a high weekly per capita cost therefore is to be expected.

There has been expended from Special Appropriation, authorized by Chapter 494, acts 1923 (\$9,850.00 for addition to water supply) prior to fiscal year 1925, \$9,044.10, during the year 1925, \$279.65. Total \$9,323.75. Authorized by Chapter 494, acts 1923, (\$6,800.00 for addition to Fire protection,) expended prior to fiscal year 1925, \$6,695.69, during year 1925 \$98.39. Total \$6,794.08. (Extraordinary expenses \$1,000.00,) expended prior to fiscal year 1925, \$999.82, nothing during the year 1925. The time limit on the above three appropriations has expired and the balances are reverting to the State Treasury. As authorized by Chapter 510, acts 1924, \$20,000.00 for Employees Building, expended prior to fiscal year 1925, \$10,858.58, during 1925, \$8,754.48. Total \$19,613.06.

As authorized by Chapter 277, acts 1925, \$36,000.00 for New Water System, there has been expended \$3,128.11. As authorized by Chapter 211, acts 1925, \$28,000.00 for alterations on Children's Pavilion, there has been expended \$20,158.33, \$33,000.00 for alterations on Women's Building, there has been expended \$15,538.78. The details of these disbursements are contained in the report of the Treasurer.

There were 192 patients in the Sanatorium at the beginning of the year, December 1st, 1924, and 102 at the close November 30, 1925. The largest number present at one time was 197, and the smallest, 88. The daily average number of patients was 130.536. Daily average number of bed patients was 68.9643, women patients 19.4822, men patients 49.4821. There were 138 patients admitted during the year: — 21 minimal, 42 moderately advanced, 57 advanced, 4 unclassified. The average age of patients admitted was 29 years. Including deaths there were 229 patients discharged, and the average duration of residence was 311 days. Of those discharged 120 gained 1,841 pounds, an average gain of 15.34 pounds per person. Of those discharged there were 4 apparently arrested, 40 quiescent, 77 improved, 51 unimproved, 11 not considered, the duration of treatment being less than one month. There were 46 deaths. There were 47,646 hospital days of treatment.

The following table shows the classification on the application blanks and our classifications:

	Classification on Application Blanks.	Our Classifications on Admission.	Per Cent.
Minimal	45	21	16.93
Moderately Advanced	70	42	33.87
Advanced	8	57	45.97
Unclassified	1	4	3.23

MEDICAL REPORT.

Appointments. — Dr. Harold Ragolsky, a graduate of Tufts College Medical School and of the Carney Hospital was appointed assistant physician Dec. 24, 1924.

Dr. Harold B. Boyd, a graduate of Western University, Ontario, Canada, and formerly assistant physician at the North Reading State Sanatorium was appointed senior assistant physician Sept. 27, 1925.

Mrs. Caroline T. White, formerly assistant superintendent of nurses at the Essex County Sanatorium was appointed superintendent of nurses Dec. 29, 1924. Resignations:

Dr. William R. Martin resigned as assistant physician March 22, 1925, to accept a similar position at the Westfield State Sanatorium.

Dr. Minot W. Gale resigned as assistant superintendent Sept. 30, 1925, to accept a similar position at the Bristol County Sanatorium.

Applicants for the position of Dentist for two days service each week are under consideration and an appointment will be made at an early date.

A medical record office has been organized, filing cases installed and the medical records are being systematically handled. The medical staff are following an approved standard form for the writing up of case histories and physical examinations, and all medical records and reports are typewritten.

The Staff has met each Monday morning for the consideration of administrative and medical problems. Clinical conferences are held Tuesday and Friday mornings in the clinic room for the examination and classification of new patients on admission and other patients for discharge. The conferences are held at the bedside for the extra-pulmonary cases. I believe these meetings have been of great value to every member of the Staff, and that the patients have benefited considerably by these combined efforts. We plan to continue them during the coming year.

The consultation clinics have been held monthly in Taunton, Brockton, Fall River and Plymouth. The number examined has been discouragingly low. This poor attendance at these clinics is due, I believe, mainly to the fact that but very few physicians now know that the clinics are still being held each month. Unless the clinics are better attended during the coming year, after the physicians have had sufficient notification, I feel that they should be discontinued in the above mentioned cities and established elsewhere.

A few selected cases of pulmonary disease have been treated by artificial pneumothorax with gratifying results.

Heliotherapy has been used extensively with most encouraging results. New patients have been continued in bed for much longer periods of time than formerly, and I believe that the results obtained justify the continuance of this policy. While it requires added nursing facilities and more individual attention, the prompt reaction of the patient's condition to absolute rest is certainly striking, and much time is gained in bringing about a quicker and better recovery. This certainly offsets the increased cost of more nurses.

LABORATORY REPORT.

Roentgenograms taken	333
Fluoroscopic examinations	15
Urine examinations	275
Sputum examinations	1,618
Positive	504
Negative	1,114

Complete Blood Counts	7
Pleural Fluid examinations	4
Guinea pig inoculations	38
Blood Wassermanns	120
Positive	2
Negative	115
Doubtful	3

FARM.

The farming operations were somewhat curtailed this year owing to the decreased population of patients and employees necessary because of the reconstruction work on the Women's and Children's Buildings. There was however, a sufficient amount of vegetables and fruit to meet our needs.

The Dairy has continued to supply all the milk used in the Institution. On a recent re-test for Tuberculosis, one reactor was found among the young stock. This heifer was at once removed and we are trying for a "clean herd" again. The fencing of land, near the coal trestle is under way. This is to be used as a pasture for young stock, and will permit us to discontinue hiring pasture land.

The Poultry plant has had an unusually successful year. A recent White Diarrhoea test of the flock by authorities from Amherst College showed but .58% reacting. 867 were tested.

IMPROVEMENTS.

The renovation of the barn for a male employees' building was completed in January and 45 employees housed there. With the opening of this building, the old house near the entrance of the sanatorium was left vacant. As this building was beyond the stage of repair and constituted a serious fire hazard, it was demolished in the Fall.

The reconstruction work on the Children's Building progressed very satisfactorily during the summer and early fall and was opened for the admission of children Nov. 27, 1925. At the close of the year 14 children had been admitted suffering from Tuberculosis of the spine, hip and knee.

The remodeling of the Women's Building has reached the point that it now appears as though it should be ready for the admission of patients early in Feb. 1926. A Dental Office has been equipped in this Building.

Exhaust hot water heaters have been installed in the Male Employees Building, Children's Building, and Administration Building. The Children's Building and Garage are now heated by exhaust steam, and should result in an appreciable saving in expense under "Heat, Light and Power."

Four-inch water lines have been brought in to the five main buildings, and are available for the connection of automatic fire extinguishers.

Additions have been made to the fire equipment and monthly fire drills are being held. The fire whistle is tested daily.

Investigations were begun at Clear Pond for a new water supply during the early summer under the direction of the Division of Sanitary Engineering and a contract was executed on June 16, 1925. Test wells were driven around the border of, and within the watershed of Clear Pond. A 14 days pumping test was conducted upon a group of several wells. This test showed that there would apparently be a sufficient amount of water. Investigations are now being made with the view of purchasing or otherwise holding the waters of Clear Pond and of lands adjacent thereto, including an area extending from the pond to the sanatorium, to be utilized in the installation of a pipe line.

It is expected that the construction of the necessary works for the new water supply will be begun early this coming year.

RECOMMENDATIONS.

I recommend that the Men's Ward be remodeled during the coming year for the treatment of adult male patients suffering from extra-pulmonary tuberculosis. Serious consideration should be given to the construction of a central medical building, which should contain a laboratory for bacteriological work, X-ray laboratory, operating, sterilizing, plaster and clinic rooms, and a dental office. Even

at this early date in the treatment of Tuberculosis of the spine, hip and knee cases, the need of such a building is very striking. A certain percentage of these cases now require or will require in the near future, operation, in some instances two stage operations are indicated. This means, under the present arrangement, that the cases coming in this operative group must be transferred to one of the Boston hospitals for operation, and later returned. Such an arrangement is most unsatisfactory and works a hardship on the patient. The cost of transportation by ambulance is high and in the long run, I believe it will be more economical and much more satisfactory for the entire treatment of the patient to be carried out at this Institution. A central medical building should be available before the capacity of this institution is enlarged to any appreciable extent. Isolation rooms could be arranged in this building to meet emergencies, should any infectious diseases appear. At the present time no such rooms are available at this Sanatorium.

I further recommend that preliminary survey and plans for an adequate sewage disposal system be made during the coming year. We have been able to get along with the old absorption trench system during the past year, because of a small population and by relaying the several pipe lines coming from the wards, but with a larger population, as anticipated during the coming year, considerable trouble may be expected because of the insufficient size and type of the present system.

ACKNOWLEDGMENTS.

Religious services have been held every week by the Protestant and Catholic Chaplains, twice every month by the Jewish Chaplain.

Grateful acknowledgment is made for the gifts of books, magazines, radio equipment and entertainments given by friends of the Institution.

I am deeply grateful to the Staff and Employees for their co-operation and efficient work during the past year.

Deeply appreciating your helpful interest and counsel, I am

Respectfully,

LEON A. ALLEY, M.D.,
Superintendent.

VALUATION.

Real Estate Report, 1925.

Grounds, 50 acres	\$10,509 67	
Lawns and buildings, 48 acres.		
Roads, 2 acres.		
Woodland, 10 acres	535 70	
Mowing, 47 acres	2,250 37	
Tillage, 49 acres	4,311 81	
Tillage, 30 acres.		
Garden, 19 acres.		
Orchard, 8 acres	611 65	
Pasture, 13 acres	696 41	
Waste and Miscellaneous, 32 acres	1,542 27	
Rough pasture, 20 acres.		
Meadow swamp land, 11 acres.		
New Coal trestle, 1 acre.		
	<hr/>	
	\$20,457 88	
Sewage system	4,882 00	
Total	<hr/>	\$25,339 88

Buildings.

Institutional buildings	\$166,510 35	
Farm, stable and grounds	39,206 72	
Miscellaneous	100,834 57	
	<hr/>	\$331,891 52
Present value of all personal property as per inventory of December, 1925		18,115 07
		<hr/>
Grand total		\$350,006 59

POPULATION.

	Males.	Females.	Boys.	Girls.	Totals.
Number received during the year	96	28	9	5	138
Number passing out of the Institution during the year	133	96	—	—	229
Number at end of the fiscal year in the Institution	88	—	9	5	102
Daily average attendance (number of inmates actually present during the year)	100.5643	29.9726	—	—	130.536
Average number of employees and officers during the year	79.1495	28.565	—	—	107.714

EXPENDITURES.

Current expenditures:		
1. Salaries and wages	\$86,286 42	
2. Clothing	—	
3. Subsistence	22,101 85	
4. Ordinary expenses	5,412 08	
5. Office, domestic and outdoors expenses	63,751 52	\$177,551 87
Extraordinary expenses:		
1. Permanent improvements		45,146 84
Addition to Fire Protection	\$98 39	
Addition to Water Supply	279 65	
Employee's Building	8,754 48	
Alterations on Children's Pav.	18,616 24	
Alterations on Women's Building	14,269 97	
New Water System	3,128 11	
Grand total		\$222,698 71

Summary of Current Expenses.

Total Expenditures	\$222,698 71	
Deduction of Extraordinary Expenses	45,146 84	\$177,551 87
Deducting amount of sales		7,371 97
		\$170,179 90

Dividing this amount by the daily average number of patients 130.5369 gives a cost for the year of \$1,303.6919, equivalent to an average weekly net cost of \$25.070.

STATISTICAL TABLES.

TABLE 1. — *Admissions and Discharges.*

	ADULTS.		CHILDREN.		Totals.
	Males.	Females.	Boys.	Girls.	
Patients in the Sanatorium Nov. 30, 1924	125	58	—	—	193
Patients Admitted Dec. 1, 1924, to Nov. 30, 1925	96	28	9	5	138
Patients discharged Dec. 1, 1924, to Nov. 30, 1925	133	96	—	—	229
Patients remaining in Sanatorium Nov. 30, 1925	88	—	9	5	102
Daily average number of patients	100.5643	29.9726	—	—	130.5369
Deaths (included in number discharged)	36	10	—	—	46

TABLE 2. — *Civil Condition of Patients admitted.*

	ADULTS.		CHILDREN.		Totals.
	Males.	Females.	Boys.	Girls.	
Single	46	16	9	5	76
Married	42	11	—	—	53
Widowed	6	1	—	—	7
Divorced	2	—	—	—	2
	96	28	9	5	138

TABLE 3. — *Age of Patients admitted.*

	ADULTS.		CHILDREN.		Totals.	Percentage.
	Males.	Females.	Boys.	Girls.		
1 to 13 years	—	—	5	4	9	6.52
14 to 20 years	13	3	4	1	21	15.22
20 to 30 years	30	20	—	—	50	36.23
30 to 40 years	25	5	—	—	30	21.74
40 to 50 years	15	—	—	—	15	10.87
Over 50 years	13	—	—	—	13	9.42
	96	28	9	5	138	—

TABLE 4. — *Nativity and Parentage of Patients admitted.*

	ADULTS.						CHILDREN.						TOTALS.		
	MALES.			FEMALES.			BOYS.			GIRLS.			Patients.	Father.	Mother.
	Patients.	Father.	Mother.	Patients.	Father.	Mother.	Patients.	Father.	Mother.	Patients.	Father.	Mother.			
United States:															
Massachusetts	40	10	9	14	4	4	8	2	2	4	1	1	66	17	16
Other N. E. States	7	9	6	1	2	3	-	-	1	-	-	-	8	11	10
Other States	10	6	5	3	3	2	-	-	-	-	-	-	13	9	7
	57	25	20	18	9	9	8	2	3	4	1	1	87	37	33
Other Countries:															
Albania	1	1	1	-	-	-	-	-	-	-	-	-	1	1	1
Armenia	3	3	3	-	-	-	-	-	-	-	-	-	3	3	3
Austria	1	1	1	-	1	1	-	-	-	-	-	-	1	2	2
British West Indies	-	1	1	2	2	2	-	-	-	-	-	-	2	3	3
Bulgaria	1	1	1	-	-	-	-	-	-	-	-	-	1	1	1
Canada	6	10	14	6	7	10	-	1	1	-	-	-	12	18	25
England	1	5	2	-	-	-	-	-	-	-	-	-	1	5	2
Greece	1	1	1	-	-	-	-	-	-	-	-	-	1	1	1
Ireland	7	20	25	1	5	4	-	1	1	-	2	2	8	28	32
Italy	8	13	13	-	-	-	-	-	-	-	-	-	8	13	13
Norway	-	1	2	1	1	1	-	-	-	-	-	-	1	2	3
Poland	1	1	1	-	-	-	-	1	1	-	1	1	1	3	3
Portugal	1	1	1	-	-	-	-	1	-	-	-	-	1	2	1
Russia	5	7	7	-	1	1	-	1	1	-	-	-	5	9	9
Scotland	1	2	1	-	1	-	-	-	-	-	-	-	1	3	1
Sweden	1	2	1	-	-	-	-	-	-	-	-	-	1	2	1
Turkey	1	1	1	-	-	-	-	-	-	-	-	-	1	1	1
Unknown	-	-	-	-	1	-	1	2	2	1	1	1	2	4	3
	96	96	96	28	28	28	9	9	9	5	5	5	138	138	138

TABLE 5. — *Residence of Patients admitted.*

	Adults.	Children.	Total.
Boston	75	3	78
Brighton	1	-	1
Brookton	1	-	1
Cambridge	7	-	7
Chelsea	3	-	3
Chicopee	-	1	1
Chicopee Falls	1	1	2
Everett	1	1	2
Fall River	6	-	6
Framingham	1	1	2
Gardner	1	-	1
Holyoke	-	1	1
Holbrook	-	1	1
Malden	2	-	2
Marshfield	1	-	1
Medfield	1	-	1
Milford	-	1	1
Middleboro	1	-	1
New Bedford	1	-	1
Newton	1	-	1
Revere	2	-	2
Rockland	1	-	1
Somerville	1	1	2
Southbridge	2	-	2
Springfield	6	2	8
Sudbury	1	-	1
Wakefield	-	1	1
Waltham	2	-	2
Westfield	1	-	1
Whitinsville	1	-	1
Winthrop	1	-	1
Worcester	1	-	1
Elizabeth, New Jersey	1	-	1
	124	14	138

TABLE 6. — *Occupation.*

	Males.	Females.	Boys.	Girls.	Totals.
Attendant	1	—	—	—	1
Attorney	1	—	—	—	1
Barber	2	—	—	—	2
Bell boy	1	—	—	—	1
Bottle washer	1	—	—	—	1
Bricklayer	2	—	—	—	2
Carpenter	3	—	—	—	3
Chauffeur	2	—	—	—	2
Clerk, Grocery	2	—	—	—	2
Clerk, Office	3	1	—	—	4
Clerk, Soda	1	—	—	—	1
Cook	3	—	—	—	3
Compositor	1	—	—	—	1
Cork grinder	1	—	—	—	1
Cotton mill	2	1	—	—	3
Druggist	1	—	—	—	1
Factory	1	1	—	—	2
Farmer	2	—	—	—	2
Furrier	1	—	—	—	1
Gardener	2	—	—	—	2
Home-at	1	2	4	3	10
Housemaid	—	4	—	—	4
Housewife	—	10	—	—	10
Insurance Inspector	1	—	—	—	1
Iron moulder	2	—	—	—	2
Janitor	4	—	—	—	4
Laborer	15	—	—	—	15
Longshoreman	2	—	—	—	2
Machinist	6	—	—	—	6
Meat cutter	1	—	—	—	1
Mechanic	1	—	—	—	1
Nurse	—	1	—	—	1
Painter	2	—	—	—	2
Plumber	1	—	—	—	1
Policeman	1	—	—	—	1
Printer	2	—	—	—	2
Roofer	3	—	—	—	3
Saleslady	—	1	—	—	1
Salesman	5	—	—	—	5
School	—	—	5	2	7
Seamstress	—	1	—	—	1
Shoe factory	3	—	—	—	3
Steam fitter	3	—	—	—	3
Stenographer	1	2	—	—	3
Stock boy	1	—	—	—	1
Student	2	—	—	—	2
Teamster	2	—	—	—	2
Telegrapher	1	—	—	—	1
Telephone operator	—	2	—	—	2
Truck driver	1	—	—	—	1
Waiter	2	—	—	—	2
Watch factory	—	2	—	—	2
	96	28	9	5	138

Total number of occupations, 52; total number of patients, 138.

TABLE 7. — *State of Disease on Admission.*

	ADULTS.		Totals.	Percentages.
	Males.	Females.		
Minimal	12	9	21	16.93
Moderately Advanced	32	10	42	33.87
Advanced	50	7	57	45.97
Unclassified	2	2	4	3.23
	96	28	124	—

	CHILDREN.		Totals.	Percentages.
	Boys.	Girls.		
T. B. of Glands	1	—	1	7.14
T. B. of Hip	2	3	5	35.71
T. B. of Spine	4	2	6	45.86
Unclassified	2	—	2	14.29
	9	5	14	—
Grand totals	105	33	138	—

TABLE 8. — *Condition on Discharge.*

	Males.	Females.	Totals.	Percentages.
Apparently Arrested	2	2	4	1.75
Quiescent	22	18	40	17.47
Improved	45	32	77	33.63
Unimproved	22	29	51	22.27
Deaths	36	10	46	20.08
Not Considered	6	5	11	4.80
	133	96	229	—

TABLE 9. — *Deaths.*

DURATION OF DISEASE.	Males.	Females.	Totals.	LENGTH OF RESIDENCE IN SANATORIUM.		
				Males.	Females.	Totals.
Under 1 month	—	—	—	1	1	2
1 to 2 months	—	—	—	3	—	3
2 to 3 months	—	—	—	2	1	3
3 to 4 months	1	—	1	3	1	4
4 to 5 months	1	—	1	—	—	—
5 to 6 months	2	—	2	3	1	4
6 to 7 months	—	—	—	2	2	4
7 to 8 months	2	—	2	2	1	3
8 to 9 months	2	—	2	1	—	1
9 to 10 months	1	1	2	2	—	2
10 to 11 months	1	—	1	—	1	1
11 to 12 months	—	—	—	3	—	3
12 to 18 months	5	1	6	5	—	5
18 to 24 months	1	1	2	5	—	5
Over 2 years	20	6	26	4	2	6
Unknown	—	1	1	—	—	—
Totals	36	10	46	36	10	46

TABLE 10. — *Cause of Death.*

	Males.	Females.	Totals.
Pulmonary tuberculosis	36	10	46
Totals	36	10	46

NORTH READING STATE SANATORIUM.

RESIDENT OFFICERS.

CARL C. MACCORISON, M.D., *Superintendent.*EARLE C. WILLOUGHBY, M.D., *Assistant Superintendent.*JOSEPH W. REDDY, M.D., *Assistant Physician.*THOMAS W. LOFT, D.M.D., *Dentist.*ETHEL M. KNIGHT, *Treasurer and Chief Clerk.*CATHERINE RYAN, R.N., *Superintendent of Nurses.*MIRA B. ROSS, *Head Matron.*J. ELLIS DOUCETTE, *Steward.*DANIEL J. SCOTT, *Chief Engineer.*EDWARD J. LEARY, *Head Farmer.*

REPORT OF THE SUPERINTENDENT.

To GEORGE H. BIGELOW, M.D., *Commissioner, Department of Public Health.*

I have the honor to submit the 17th annual report of the North Reading State Sanatorium for the year ending Nov. 30, 1925.

During the year there has been expended \$141,213.26 for maintenance, a gross weekly per capita cost of \$17.92.

There has been collected from miscellaneous sources \$66,260.73 (the total of all collections). Deducting this amount from the gross maintenance expenses leaves a net expense of \$74,952.53. The net weekly per capita cost was \$9.387. There has been collected from private funds \$9,116.79; from cities and towns \$56,375.90. Eighty-eight cases were supported wholly or in part by private funds; one hundred and ninety by cities and towns; and seventy-nine wholly by the State.

There were 196 patients at the Sanatorium at the beginning of the year, 106 at the close. The largest number present at any one time was 199, and the smallest 105. The daily average number of patients was 151.06. There were 161 cases

admitted during the year, 134 less than last year — 25 Minimals; 87 Moderately Advanced; 49 Advanced.

There were 142 cases admitted from cities and towns of over 25,000 population, and 18 from cities and towns under 25,000 population; 1 no home. The average age of patients was 17.80. Including deaths, there were 251 cases discharged and the average duration of residence was 8 months and 24 days. Of those discharged 171 gained 2,326 lbs. — an average gain of 13.6 pounds per person. Of the discharges there were 9 apparently Arrested cases, two less than last year; 34 Quiescent, the same as last year; 88 Improved, three more than last year; 81 Unimproved. There were 15 patients Not Considered — the duration of treatment being less than one month. There were 24 Deaths — 31 less than last year. There were 55,137 hospital days of treatment.

In July we were forced to vacate Pavilions B East and West, Camp 3 East and Camp 2 West, and in August Pavilion C East, in order that the alterations and additions could be started on this building.

This reduced the available number of beds by 78. Consequently with the low census of the past five months, our per capita cost has been considerably increased.

The following table shows the classification on the application blank and our classification of admission.

	Classification on Application Blanks.	Our Classification on Admission.
Minimal	44	25
Incipient	5	—
Moderately Advanced	98	87
Advanced	14	49
	<hr/> 161	<hr/> 161

MEDICAL REPORT.

Dr. Joseph L. Moskowitz, resigned March 21, 1925, to enter private practice, and Dr. Harold B. Boyd was appointed to fill the vacancy May 4, 1925, and resigned Sept. 26th to accept position as Senior Physician at the Lakeville State Sanatorium. Dr. Samuel D. Randall, our part time dentist, died July 14, 1925, and Dr. Thomas W. Loft was appointed to fill the vacancy on July 29, 1925.

The following examinations were made in our laboratory: Sputum examinations: positive 663, negative 1,388, total 2,051. Urine Analyses, 813; White Blood Counts, 63; Red Blood Counts, 2; Differential Blood Counts, 1; Genito-urinary smears, 10; other smears, 5; Throat Cultures, 3; Quantitative Tests for Sugar in Urine, 34; Pleuritic Fluids, 2; Guinea Pigs Inoculated, 23; Babcock Milk Tests, 77.

Wassermann Tests. — Positive, 10; Negative, 153; Doubtful, 4; Unsatisfactory, 4; Total, 171.

X-ray Films. — Number of X-ray films made, 409; of this number 127 were made of consultation clinic cases or underweight school clinic patients.

Dentistry. — The following is a summary of the dental work done during the year: Number of patients examined, 940; Prophylaxis, 171; Extractions, 174; Pyorrhea, 49; Vulcanite Plates, 12; Synthetic Fillings, 24; Cement Fillings, 41; Amalgam Fillings, 51; Gold Fillings, 7; Temporary Fillings, 44; Repair Plates, 3; Crowns, 16; Bridges, 24; Defective Crowns, 11; Bridges Removed, 4; Stomatitis, 1; X-ray, 4; Irrigations, 10.

Consultation Clinics. — The consultation clinics have been held monthly in Lowell, Lawrence, Haverhill and Woburn, except that in March none was held in Woburn, and in June none was held in Haverhill. The total number of cases referred to these city clinics was 73, being 18 less than last year. The following table shows the number of cases referred to these clinics: Lowell, 2; Lawrence, 23; Haverhill, 39; Woburn, 9. In addition to the above there were 77 cases referred to our sanatorium for consultation, or three more than last year. Of the 150 cases examined, 28 were classified as Active Pulmonary Tuberculosis; 6 as Inactive; 9 as Non-Pulmonary Tuberculosis; 96 as Observation, and 11 Hilum Tuberculosis.

The physicians of the Sanatorium assisted in the examinations made at the under-
weight school clinics held in the following towns or cities; Maplewood, Stoneham,
Andover, Middleton, Lawrence and Beverly.

The number of ex-patients who have returned for re-examination is 29. Of
this number 20 returned once; 8 returned twice and 1 returned four times.

IMPROVEMENTS.

A new 5 x 8 single action Triplex pump with 20 horse power motor has been
installed in the pump house. The south side of the roof of the Administration
Building has been shingled and a new floor laid at the barn. Work is well under
way on the alterations and additions to Pavilions B and C East and Pavilion B
West. Pavilion B East should be ready for occupancy by January, 1925.

RECOMMENDATIONS.

The most urgent need of this Institution at the present time is a building for
employees, and a school house. We lack about twenty beds for our present quota
of employees, and with the completion of the buildings now being enlarged and the
opening of a school, it will be necessary to find quarters for additional employees
outside of the Institution.

We recommend that a combination school and employees' building be erected
to take care of from 30 to 40 employees on the second floor, and class room accom-
modations for about 300 children on the first floor. The erection of this building
would necessitate extensive additions and alterations to our power plant and the
laying of a new supply and return main from the power plant to the West ward.
In addition to this, it will probably be necessary to lay a larger hot water supply
line.

ACKNOWLEDGMENTS.

Religious services have been held each Sunday by the Protestant and Catholic
chaplains, and by the Rabbi on Tuesday of each week. Father Brown was ap-
pointed to fill the vacancy caused by the death of Father Whalen.

Many gifts of flowers, books, periodicals, etc., have been received from thought-
ful friends and a quantity of clothing for children from the Needlework Guild
(Winchester Branch) for which I wish to extend my thanks.

To the staff and employees I am grateful for their efficient work and loyalty dur-
ing the past year.

Respectfully submitted,
CARL C. MACCORISON,
Superintendent.

VALUATION.	
Land.	
Grounds, 11.82 acres	\$569 37
Lawns and Buildings, 11.07 acres.	
Roads, .75 acres.	
Woodland, 23.66 acres	1,139 70
Mowing, 16.45 acres	792 39
Tillage, 6.01 acres	289 50
Tillage, .88 acres.	
Garder, 5.13 acres.	
Orchard, 3.99 acres	192 20
Pasture, 2.09 acres	100 67
Waste and Miscellaneous, 37.73 acres	1,817 45
Rough Pasture, 6.98 acres.	
Meadow Swamp Land, 30. acres.	
Coal Trestle, .75 acres.	
Sewage system	\$4,901 28
	7,567 31
	\$12,468 59
Buildings.	
Institution Buildings	\$175,588 68
Farm, Stable and Grounds	16,392 00
Miscellaneous	93,867 84
	285,848 52
	\$298,317 11
Present value of all personal property as per inventory of December 1, 1925	80,530 46
Grand total	\$378,847 57

POPULATION.

	Males.	Females.	Totals.
Number received during the year	73	88	161
Number passing out of the Institution during the year	135	116	251
Number at end of fiscal year in the Institution	52	54	106
Daily average attendance (number of inmates actually present during the year)	83.48	67.58	151.06
Average number of employees and officers during year	45.61	28.78	74.39

EXPENDITURES.

Current Expenditures:			
1. Salaries and Wages	\$72,522	41	
2. Clothing		16	12
3. Subsistence	49,528	61	
4. Repairs Ordinary	3,155	78	
5. Office, Domestic and Outdoor Expenses	13,161	17	
			\$138,384 09
Extraordinary Expenses:			
1. Permanent Improvements to Existing Buildings			2,829 17
Grand total			\$141,213 26

Summary of Current Expenses.

Total Expenditures	\$141,213	26	
Deducting Extraordinary Expenses			138,384 09
Deducting amount of sales			137,616 05

Dividing this amount by the daily average number of patients — 151.06 gives a cost for the year of \$911.00, equivalent to an average weekly net cost of \$17.52.

STATISTICAL TABLES.

TABLE I. — *Admissions and Discharges.*

	Males.	Females.	Totals.
Patients in Sanatorium Dec. 1, 1924	114	82	196
Patients admitted from Dec. 1, 1924, to November 30, 1925, incl.	73	88	161
Patients discharged from Dec. 1, 1924, to November 30, 1925, incl.	135	116	251
Patients remaining in Sanatorium November 30, 1925	52	54	106
Daily average number patients	83.48	67.58	151.06
Deaths (included in number discharged)	15	9	24

TABLE II. — *Civil Condition of Patients admitted.*

	Males.	Females.	Totals.
Single	39	47	86
Married	27	35	62
Widowed	6	5	11
Divorced	1	1	2
	73	88	161

TABLE III. — *Age of Patients admitted.*

	Males.	Females.	Totals.	Percentages.
14 to 20 years	10	13	23	14.289
20 to 30 years	26	48	74	45.962
30 to 40 years	20	14	34	21.118
40 to 50 years	7	8	15	9.316
50 years or more	10	5	15	9.316
	73	88	161	—
Average age	18.54	17.19	17.80	

TABLE IV. — *Nativity and Parentage of Patients admitted.*

PLACE OF NATIVITY.	MALES.			FEMALES.			TOTALS.		
	Patients.	Fathers.	Mothers.	Patients.	Fathers.	Mothers.	Patients.	Fathers.	Mothers.
United States	52	19	8	59	19	22	111	38	40
Massachusetts	45	13	11	52	15	16	97	28	27
Other N. E. States	6	3	4	7	4	6	13	7	10
Other States	1	3	3	—	—	—	1	3	3
Total	52	19	18	59	19	22	111	38	40
Other Countries:									
Canada	8	10	12	14	22	24	22	32	36
England	1	4	5	—	1	2	1	5	7
Finland	1	1	1	—	—	—	1	1	1
France	—	1	1	—	1	—	—	2	1
Germany	1	1	1	—	—	—	1	1	1
Greece	—	—	—	1	1	1	1	1	1
Holland	—	1	1	—	—	—	—	1	1
Hungary	1	1	1	—	—	—	1	1	1
Ireland	4	23	22	7	23	22	11	46	44
Italy	2	4	4	3	6	5	5	10	9
Lithuania	—	1	1	—	—	—	—	1	1
Norway	—	1	1	—	—	1	—	1	2
Poland	—	—	—	—	1	1	—	1	1
Russia	3	4	4	1	2	1	4	6	5
Scotland	—	—	—	—	2	1	—	2	1
Sweden	—	—	—	2	8	5	2	8	5
Switzerland	—	—	—	—	—	1	—	—	1
Syria	—	—	—	—	1	1	—	1	1
Turkey	—	—	—	1	1	1	1	1	1
Total Foreign	21	52	54	29	69	66	50	121	120
Unknown	—	2	1	—	—	—	—	2	1
	21	54	55	29	69	66	50	123	121
Grand Totals	73	73	73	88	88	88	161	161	161

TABLE V. — *Residence of Patients admitted.*

Andover, 1	Lowell, 4	Revere, 2
Beachmont, 1	Lynn, 2	Salem, 2
Boston, 98	Malden, 6	Somerville, 6
Brookline, 2	Manchester, 1	Springfield, 3
Cambridge, 4	Medford, 1	Waltham, 1
Chelsea, 4	Methuen, 1	Watertown, 1
Dracut Centre, 1	Nantucket, 1	Whitinsville, 1
Everett, 1	New Bedford, 1	Winthrop, 3
Fall River, 1	Newburyport, 1	Wollaston, 1
Gardner, 2	Newton, 1	No home, 1
Greenfield, 2	Onset, 1	Total, 161
Haverhill, 1	Reading, 1	

TABLE VI. — *Occupation of Patients admitted.*

	Males.	Females.		Males.	Females.
Agent (Purchasing)	1	—	Orderly	1	—
Bookkeeper	2	2	Painter	2	—
Carpenter	1	—	Pharmacist	1	—
Chemist	1	—	Plumber	1	—
Clerk	8	5	Printer	2	1
Designer	1	—	Reporter	1	—
Domestic	—	2	Saleslady	—	1
Electrician	1	—	Salesman	4	—
Elevator Operator	2	—	Sheet Metal worker	1	—
Factory Worker	5	7	Shipper	2	—
Freight Handler	1	—	Shopkeeper	1	—
Harness Maker	2	—	Stenographer	—	6
Hostler	1	—	Stewardess	—	1
Housewife	—	29	Stockboy	1	—
Housework	—	9	St. Ry. Employee	1	—
Janitor	3	—	Student	4	—
Laborer	3	—	Teacher	—	1
Laundry worker	—	1	Teamster	1	—
Leather Worker	1	—	Telephone Operator	—	4
Lithographer	1	—	Telephone worker	3	—
Machinist	2	—	Waiter	3	—
Matron	—	1	Waitress	—	6
Meat Cutter	1	—	Welder	1	—
Mechanic	1	—	None	2	9
Messenger	1	—			
Mill Operative	—	1			
Nurse	1	2			
				73	88

Grand total, 161.

TABLE VII. — *Stage of Disease on Admission.*

	Males.	Females.	Totals.	Percentages.
Minimal	8	17	25	15.521
Moderately Advanced	44	43	87	54.037
Advanced	21	28	49	30.434
	73	88	161	—

TABLE VIII. — *Condition on Discharge.*

	Males.	Females.	Totals.	Percentages.
Apparently Arrested	6	3	9	3.585
Quiescent	17	17	34	13.545
Improved	52	36	88	35.059
Not Considered	8	7	15	5.976
Unimproved	37	44	81	32.260
Died	15	9	24	9.561
Totals	135	116	251	—

TABLE IX. — *Deaths.*

DURATION OF DISEASE.	Males.	Females.	Totals.	LENGTH OF RESIDENCE AT SANATORIUM.		
				Males.	Females.	Totals.
Under 1 month	—	—	—	2	—	2
1 to 2 months	—	—	—	2	1	3
2 to 3 months	—	—	—	1	1	2
3 to 4 months	1	—	1	2	—	2
4 to 5 months	—	—	—	—	4	4
5 to 6 months	—	1	1	—	—	—
6 to 7 months	—	—	—	—	1	1
7 to 8 months	—	—	—	1	—	1
8 to 9 months	1	1	2	—	—	—
9 to 10 months	—	—	—	—	1	1
10 to 12 months	2	—	2	1	—	1
12 to 18 months	2	2	4	4	1	5
19 to 24 months	1	3	4	—	—	—
Over 2 years	8	2	10	2	—	2
Totals	15	9	24	15	9	24

TABLE X. — *Cause of Death.*

	Males.	Females.	Totals.
Tuberculosis of Lungs	15	9	24

RUTLAND STATE SANATORIUM.

RESIDENT OFFICERS.

ERNEST B. EMERSON, M.D., *Superintendent.*
HALBERT C. HUBBARD, M.D., *Assistant Superintendent.*
WILLIAM B. DAVIDSON, M.D., *Senior Physician and Roentgenologist.*
MARK H. JORESS, M.D., *Assistant Physician.*
JOSEPH MULLER, M.D., *Assistant Physician.*
PAUL DUFALT, M.D., *Assistant Physician.*
FRANK H. WASHBURN, M.D., *Consulting Surgeon Non-resident.*
WILLIAM J. O'CONNOR, D.M.D., *Non-resident.*
MARY A. BOYLE, *Treasurer and Chief Clerk.*
DELYA E. NARDI, R.N., *Superintendent of Nurses.*
CORA A. PHILLIPS, *Head Matron.*
OLIN C. BLAISDELL, *Steward.*
HARRY U. WENDELL, *Chief Engineer.*
JOSEPH A. CARROLL, *Head Farmer.*

REPORT OF THE SUPERINTENDENT.

To Dr. GEORGE H. BIGELOW, *Commissioner, Department of Public Health.*

I have the honor to submit the twenty-ninth annual report of the Rutland State Sanatorium for the year ending November 30, 1925.

The year just closed is a marker in the policy of caring for the tuberculous which is reflected in the financial returns to the Commonwealth since the increase in private rates and the county contracts went into effect as well as in the changing type of cases admitted.

During the year there has been expended \$283,585.08 for maintenance, a gross weekly per capita cost of \$15.7626. There has been expended from the special appropriation authorized by Chapter 126, Resolves of 1924, \$148.72.

There has been collected from miscellaneous sources (the total of all collections), \$163,148.08, an increase of 103.85 per cent over the collection of last year. Deducting this amount from the gross maintenance expense leaves a net expense of \$120,437.00, a net weekly per capita cost of \$6.6942. There has been collected from private sources \$41,565.64, an increase over last year and the largest collection in the history of the institution; from cities and towns \$93,253.99; from Worcester County \$21,220.00; from the United States Veterans Bureau \$4,666.67.

One hundred and twelve cases were supported wholly or in part from private funds; one hundred and seventy-four by cities and towns; forty-one wholly by the State; one by the Department of Public Welfare, Division of State Minor Wards; seventy-one by Middlesex County; forty-four by Worcester County; three by Winthrop, Revere and Chelsea Hospital District. There were sixty-seven cases on which settlement had not been determined.

There is noted an increase in the admissions and discharges with a falling off in the number of hospital days together with a marked increase in the number of hospital cases rather than the sanatorium type admitted in previous years.

There were 349 patients in the sanatorium at the beginning of the year, 349 at the close. The largest number present at one time was 365 and the smallest 330. The daily average number of patients was 345.98, a decrease of 14. There were 513 patients admitted during the year, 75 more than last year; 71 minimal, 142 moderately advanced, 275 far advanced and 25 unclassified. There were 301 admitted from cities and towns of over 25,000 population and 212 from cities and towns under 25,000 population. The average age of patients admitted was 31.06, an increase of 3 years. Including deaths there were 513 patients discharged, 56 more than last year, and the average duration of residence was 238 days, 50 days less than last year. Of those discharged 318 gained 3,589 pounds, an average gain of 11.28 pounds per person. Of the discharges there were 11 arrested cases, 4 more than last year, 26 apparently arrested cases, 2 more than last year, 215 quiescent cases, 9 less than last year, 58 improved, 72 unimproved and 32 not considered the duration of treatment being less than one month. There were 13 discharged

non-tuberculous and 2 on whom no diagnoses were made. There were 85 deaths, 32 more than last year. There were 126,286 days of treatment, 5,483 less than last year.

The following table shows the classification on the application blank and our classification on admission:

	CLASSIFICATION ON APPLICATION BLANKS.		OUR CLASSIFICATION ON ADMISSION.		PER CENT.	
	1924.	1925.	1924.	1925.	1924.	1925.
Minimal	213	170	97	71	22.14	13.84
Moderately advanced	187	228	171	142	39.04	27.68
Far advanced	14	60	157	275	35.85	53.61
Unclassified	24	55	13	25	2.97	4.87
	438	513	438	513		

The following is a report of the work done in the laboratory during the year: Urine examinations: Routine, 663; 24 hour specimens, 18; Total 681. Sputum examinations for the tubercle bacilli: positive, 2,759; No tubercle bacilli found, 3,875; Total 6,634. Blood drawn for Wassermann test: Doubtful, 6; Positive, 23; Negative, 438; Total 467. Blood Counts, 56; Guinea pig inoculations, 25; Smears for differentiation of bacteria, 22; Cultures, 5; Examination of feces, 5; Preparation of autogenous vaccine, 1; Bacteriological examination of milk, 6.

Of 349 patients remaining in the sanatorium November 30, 1925, 4 per cent report no sputum, 80 per cent have positive sputum and no tubercle bacilli found in 16 per cent.

X-Ray Report. — X-ray plates (chest), 1,100; X-ray plates (teeth), 75.

Dentistry. — The following is a summary of the dental work done during the year: Office visits, 2,692; Mouth washes, 306; Amalgam fillings, 248; Cement fillings, 154; Gutta Percha fillings, 304; Temporary fillings, 141; Surgical dressings, 18; Extractions, 492; Post extractions, 206; Vincent's Disease, 20; Gingivitis, 42; Trismus, 4; Abscess cases, 176; Abscesses treated, 152; Stomatitis, 62; Bed treatments, 49; Bone dissections, 3; Hemorrhages checked, 2; Inlays, 44; Plates repaired, 22; Bridges, 41; Crowns, 82; Extractions under novocaine, 476; Extractions under ethyl chloride, 16; Prophylactics, 321; X-rays, 75; Pulp treatments, 5; Tuberculous mouth, 2; Tuberculous tongue, 1; Tuberculous palate, 1; Impacted teeth extracted, 4; Bridges repaired, 14.

Consultation Clinics. — The consultation clinics instituted five years ago have passed the experimental stage. They have brought to the people a service that was needed, and have established a personal touch between the sanatorium and the public which is to the advantage of both. The following tables indicate the work done this year and the increase over that of last year.

The clinic at Fitchburg has been discontinued and a clinic established at Framingham in its place. Weekly clinics have been held there and at Worcester, Gardner and Clinton.

Number of patients examined: 206. Diagnosis: Tuberculosis, 136; Non-tuberculous, 26; Observation, 83.

Eleven ex-patients reported for follow-up examinations (34 in all) making a total of 279 examinations.

Number of patients examined: once, 161; twice, 25; three times, 6; five times, 2; six times, 1.

Number of ex-patients examined: once, 5; twice, 2; five times, 3; ten times, 1.

Number of physicians referring patients 71, 19 more than last year.

There were 26 patients admitted to the sanatorium following examinations at the clinics, 16 more than last year.

The following examinations were made at the sanatorium: Patients referred by physicians, 120 (77 more than last year); Patients examined at own request, 108; Ex-patients' follow-up examinations, 192; Total 420. Diagnosis: Tuberculosis, 170; Non-tuberculous, 73; Observation, 76.

One hundred and ninety-two ex-patients reported for follow-up examinations (250 in all) making a total of 511 examinations.

Number of patients examined: once, 200; twice, 23; three times, 5.

Number of ex-patients examined: once, 149; twice, 31; three times, 10; four times, 1; five times, 1.

Number of physicians referring patients 68, 36 more than last year.

There were 38 patients admitted to the sanatorium following examinations at the sanatorium.

Examinations of school children were made in Orange and Three Rivers: Total number of school children examined, 83; Total number of adults examined at school clinics, 9; Total 92. Diagnosis: Tuberculosis, 16; Non-tuberculous, 23; Observation, 53; Total, 92.

The total of all examinations made during the year exclusive of routine work was 882, 53 more than last year.

The vacancy on the Staff at the beginning of the year was filled by the appointment of Dr. Paul Dufault.

The training school for nurses is now entering its eighteenth year. During this time it has solved the nursing shortage which in many institutions has been at times most acute, and has been an exemplification of practical vocational training for both men and women as well as a financial asset to the Commonwealth. The demand from other sanatoria for our graduates far exceeds the supply.

The following affiliations supplement the course given at the sanatorium:

Cooley-Dickinson Hospital — obstetrics and surgery.

Worcester City Hospital — pediatrics and medicine.

Worcester State Hospital — mental diseases.

Worcester Society for District Nursing — practical work in the field.

There are 41 pupil nurses; 15 seniors, 14 intermediates, 5 juniors and 7 probationers.

The following have been awarded diplomas during the year:

John Prescott Porter.

Lola MacKenney.

Grace Myrtle Rice.

Jessie Fortune.

Catherine Veronica Hardiman.

Catherine Josephine Ryan.

Etta Muriel March.

Bertha Frances Eccleston.

Edith May Converse.

Elsie May MacFarlane.

Marion Marie Reynolds.

Anne Cross Porter.

As in past years, weekly lectures to patients through the winter months supplemented by informal talks in the wards have been continued by the Medical Staff. Patients and employees have shown much interest and we feel that the general attitude toward taking treatment, at best an irksome routine, improves in proportion to the knowledge of the disease possessed by the average patient.

I am not in sympathy with the statement frequently heard that sanatorium patients lack the intelligence or the will power to take the cure. It is not a measure of intelligence that many on arrival have little knowledge of the disease or the underlying principles of its treatment; invariably they are anxious to learn, and as they learn they co-operate intelligently and pass on their knowledge to the newcomer and to friends and neighbors at home. The education of the tuberculous patient transcends the mere prescription of rest, fresh air and diet, for without a knowledge of the disease, and reasons why, the prescription is only half swallowed. Education of the patient being a prerequisite to successful treatment early sanatorium care should precede home treatment or experiments with milk and eggs on a farm.

Clinical conferences have been held twice a week throughout the year and in many instances have been attended by outside physicians. All admissions have been presented for the consideration of diagnosis, prognosis and treatment by the

entire Medical Staff, and later as occasion required brought before the Staff for further study.

In co-operation with the Wachusett Medical Improvement Society, a three-day course in tuberculosis was given by the Sanatorium Staff and Dr. Henry D. Chadwick of Westfield. There were forty in attendance.

Dr. Mark H. Joress published a paper on "The Importance of Early Treatment in Pulmonary Tuberculosis."

Dr. Joseph Muller has read a paper, not yet published, on "Easy Methods in Diagnosis of Skin Diseases as Taught in the Hungarian School of Dermatology."

Dr. William B. Davidson has given a course of lectures at the Holden District Hospital, Holden, and at the Heywood Hospital, Gardner, Massachusetts.

An increase in the number of bed patients has been noted in previous reports and provision for their nursing has been made this year by the addition of four pupil nurses and an assistant to the Superintendent of Nurses. These additions to the Nursing Staff further emphasize the inadequate living quarters provided the female employees also mentioned in previous reports. At the present time fifty per cent of these employees, including nurses in training, are housed in dormitories and rooms adjacent to or opening off the ward corridors, and are compelled to share toilets and locker rooms in common with the patients. Such living conditions are subversive of the morale in both groups and are not tolerated by the non-tuberculous employee; yet the ex-patient by reason of misfortune has been forced to accept the situation in order that she may continue under a modified sanatorium routine and at the same time become self-supporting. Space now occupied by nurses and employees is needed more than ever for the care of patients, either terminal or acute cases requiring intensive care and nursing. I believe that every State employee is entitled to and ought to have a room by herself particularly nurses in the training school, who in addition to their regular ward work are carrying on a prescribed course of study.

I am therefore renewing my recommendation that a dormitory or home be provided for the women employees in order to relieve the situation as outlined.

An increase in the capacity of the refrigerator system is greatly needed. We have a single unit 10 ton machine which we are obliged to run continuously, at an overload during the warm weather with no provision for a breakdown. I am therefore recommending the installation of an additional machine of 15 tons capacity to carry the regular load, leaving the present machine for emergency use. The estimated expense including changes in the building is \$8,500.00.

The news of the death of Dr. Eugene R. Kelley, Commissioner of Public Health, came in the sense of a personal loss to those who looked to him as a friend rather than as an impersonal official. He had a warm personal interest in everyone and his visits to the wards brought a spirit of cheer and optimism. Eminent in public health work with a remarkable grasp of details, which in no way befogged his vision of the future, the Commonwealth loses a most conscientious worker in the interests of better health. To those associated with him his energy was an inspiration and his counsel invaluable.

The religious activities have been continued without change of personnel. The Reverend Father McNamara, Chaplain Thomas Livingston, Reverend Father William Smith, Rabbi H. S. Bloom and Reverend Milton Robison, who supplied during the illness of Chaplain Livingston, by their personal contact have brought comfort and consolation not to be measured. Their counsel and the loyal support of my fellow workers have made possible whatever service has been rendered.

Respectfully,

ERNEST B. EMERSON,
Superintendent.

VALUATION.

Land.

Grounds, 45.837 acres		\$16,706 20	
Lawns and Buildings, 35.837 acres.			
Roads, 10.00 acres.			
Woodland, 69.00 acres		2,553 00	
Mowing, 89.95 acres		9,826 50	
Tillage, 29.64 acres		2,964 00	
Tillage, 27.13 acres.			
Garden, 2.51 acres.			
Orchard, 1.64 acres		328 00	
Pasture, 76.75 acres		2,798 55	
Waste and Miscellaneous, 51.91 acres		1,980 45	
Rough Pasture, 27.21 acres.			
Meadow Swamp, 18.22.			
Sewer Beds, 5.98 acres.			
Coal Trestle, .50 acres.			
Sewerage System		15,508 32	
			\$52,665 02
<i>Buildings.</i>			
Institution buildings		\$543,394 74	
Farm, Stable and Grounds		33,875 00	
Miscellaneous		55,236 67	632,506 41
			\$685,171 43
Present value of all personal property as per inventory of Dec. 1, 1925			86,362 81
Grand total			\$771,534 24

POPULATION.

	Males.	Females.	Totals.
Number received during the year	267	246	513
Number passing out of the institution during the year	256	257	513
Number at end of fiscal year in the institution	190	159	349
Daily average attendance (number of inmates actually present during the year)	173.92	172.06	345.98
Average number of employees and officers during the year	122.17	67.45	189.62

EXPENDITURES.

Current expenditures:			
1. Salaries and wages		\$138,919 21	
2. Clothing		260 05	
3. Subsistence		75,323 53	
4. Ordinary repairs		8,132 36	
5. Office, domestic and outdoor expenses		60,949 93	
			\$283,585 08
Extraordinary expenses:			
1. Permanent improvements to existing buildings			148 72
			\$283,733 80
<i>Summary of Current Expenses.</i>			
Total expenditure		\$283,733 80	
Deducting extraordinary expenses		148 72	
			\$283,585 08
Deducting amount of sales			1,101 45
			\$282,483 63

Dividing this amount by the daily average number of patients 345.98, gives a cost for the year of \$816.47, equivalent to an average weekly net cost of \$15.70.

STATISTICAL TABLES.

TABLE 1. — *Admissions and Discharges.*

	Males.	Females.	Totals.
Patients in sanatorium Nov. 30, 1924	179	170	349
Patients admitted Dec. 1, 1924 to Nov. 30, 1925 inclusive	267	246	513
Patients discharged Dec. 1, 1924 to Nov. 30, 1925 inclusive	256	257	513
Patients remaining in sanatorium Nov. 30, 1925	190	159	349
Daily average number of patients	173.92	172.06	345.98
Deaths (included in number discharged)	45	40	85

TABLE 2. — *Civil Condition of Patients admitted.*

	Males.	Females.	Totals.
Single	128	133	261
Married	120	100	220
Widowed	16	12	28
Divorced	3	1	4
	267	246	513

TABLE 3. — *Age of Patients Admitted.*

	Males.	Females.	Totals.	Percentages.
Under 14 years	—	—	—	—
14 to 20 years	35	40	75	14.62
20 to 30 years	99	126	225	43.86
30 to 40 years	65	44	109	21.25
40 to 50 years	38	26	64	12.47
Over 50 years	30	10	40	7.80
Average age	28.45	34.49	31.06	—
	267	246	513	—

TABLE 4. — *Nativity and Parentage of Patients admitted.*

PLACE OF NATIVITY.	MALES.			FEMALES.			TOTALS.		
	Patients.	Fathers.	Mothers.	Patients.	Fathers.	Mothers.	Patients.	Fathers.	Mothers.
United States:									
Massachusetts	157	43	44	147	60	52	304	103	96
Other New England States	11	18	17	18	15	16	29	33	33
Other States	5	9	7	19	14	17	24	23	24
Total Native	173	70	68	184	89	85	357	159	153
Other Countries (26):	94	195	199	62	156	157	156	351	356
Total Foreign	—	2	—	—	1	4	—	3	4
Unknown									
Grand Totals	267	267	267	246	246	246	513	513	513

TABLE 5. — *Residence of Patients admitted.*

Place Number	Place Number	Place Number
Adams, 1	Hingham, 1	Reading, 6
Arlington, 5	Holden, 1	Revere, 6
Ashburnham, 1	Holliston, 1	Royalston, 1
Ashland, 1	Holyoke, 3	Rutland, 3
Athol, 3	Hopedale, 1	Sherborn, 1
Ayer, 3	Hopkinton, 1	Somerville, 23
Barre, 1	Hudson, 9	Southborough, 1
Belmont, 2	Huntington, 1	Southbridge, 3
Blackstone, 1	Lancaster, 1	Spencer, 4
Boston, 75	Leominster, 9	Springfield, 16
Brockton, 1	Lexington, 2	Stoneham, 3
Brookfield, 1	Lincoln, 1	Stow, 1
Brookline, 4	Littleton, 1	Townsend, 1
Burlington, 1	Lowell, 5	Upton, 1
Cambridge, 7	Ludlow, 1	Uxbridge, 3
Chelmsford, 1	Lynn, 1	Wakefield, 6
Chelsea, 16	Malden, 25	Waltham, 11
Chicopee, 1	Marlborough, 7	Ware, 2
Chicopee Falls, 2	Maynard, 6	Watertown, 11
Clinton, 6	Medford, 15	Waverley, 2
Concord, 1	Melrose, 5	Webster, 9
Deerfield, 1	Methuen, 1	Westborough, 2
Douglas, 1	Middleborough, 1	Weston, 1
Dudley, 1	Milford, 9	West Springfield, 1
Everett, 18	Millbury, 1	Weymouth, 1
Fall River, 8	Natick, 3	Wilbraham, 1
Fitchburg, 8	New Bedford, 1	Wilmington, 1
Framingham, 7	Newton, 20	Winchendon, 4
Gardner, 18	North Adams, 1	Winchester, 1
Grafton, 3	Northborough, 2	Winthrop, 1
Greenfield, 2	Northbridge, 2	Woburn, 4
Greenwood, R. I., 1	North Brookfield, 2	Worcester, 33
Hardwick, 3	Norwood, 2	Total, 513.
Haverhill, 1	Pepperell, 1	

TABLE 6. — *Occupation of Cases admitted.*

	Males.	Females.		Males.	Females.
Accountant	3	—	Maid, Nurse	—	2
Agent, Purchasing	1	—	Mechanic, Auto	2	—
Artist	1	—	Merchant	4	—
Attendant	4	4	Mill Work	5	6
Barber	1	—	Moulder	1	—
Blacksmith	2	—	Musician	1	—
Bookbinder	1	—	No Occupation	—	8
Bookkeeper	5	3	Nurse, Graduate	—	6
Brakeman	2	—	Nurse, Pupil	2	3
Carpenter	10	—	Nurse, Practical	—	3
Chambermaid	—	2	Operator, Ediphone	—	1
Chauffeur	8	—	Operator, Telephone	—	3
Checker	—	1	Painter, Auto	1	—
Chemist	1	—	Painter, House	3	—
Cigar Maker	2	—	Pharmacist	1	—
Clerk	34	23	Photographer	1	—
Compositor	1	—	Physician	3	—
Conductor, Elevated	1	—	Pipe Maker	1	—
Cutter, Shoe	2	—	Plumber	2	—
Cutter, Stone	2	—	Policeman	3	—
Decorator, Interior	1	—	Porter	4	—
Dentist	2	—	Pressman	1	—
Designer	1	—	Printer	3	—
Dishwasher	1	—	Rancher	1	—
Dressmaker	—	5	Repairman, Auto	1	—
Electrician	5	—	Repairman, Shoe	1	—
Electrotypewriter	1	—	Roofer	1	—
Engineer	2	—	Salesman	13	2
Engraver	1	—	Selector	1	—
Factory	15	27	Sheet Metal Worker	3	—
Farmer	4	—	Shipper	1	—
Finisher, Furniture	1	—	Shoeworker	9	4
Fireman	4	—	Spinner	—	2
Foreman	3	—	Steamfitter	2	—
Fruit Grower	1	—	Stenographer	—	13
General Work	5	—	Student	15	13
Hairdresser	—	2	Superintendent	2	—
Hem Stitcher	—	1	Tailor	3	—
Housekeeper	—	7	Teacher	—	6
Housewife	—	77	Teamster	5	—
Housework	—	12	Trainman	1	—
Inspector	1	—	Trucking	1	—
Janitor	2	—	Typist	—	1
Kitchen Work	—	1	Valet	1	—
Laborer	16	—	Waiter	2	—
Laundry Work	3	2	Waitress	—	3
Letter Carrier	1	—	Watchman	1	—
Librarian	—	1	Weaver	5	2
Locksmith	1	—	Yard Master	1	—
Machinist	7	—			

Total occupations, 99; total number of patients, 513, — males, 267, females, 246.

TABLE 7. — *Stage of Disease at Admission.*

	Males.	Females.	Totals.	Percentages.
Minimal	28	43	71	13.84
Moderately advanced	73	69	142	27.68
Far advanced	152	123	275	53.61
Unclassified	14	11	25	4.87
Totals	267	246	513	

TABLE 8. — *Condition on Discharge.*

	Males.	Females.	Totals.	Percentages.
Arrested	2	9	11	2.14
Apparently arrested	13	13	26	5.07
Quiescent	112	103	215	41.91
Improved	24	34	58	11.31
Unimproved	32	39	71	13.84
Deaths	45	40	85	16.57
Non-tuberculous	6	7	13	2.53
No diagnosis	1	1	2	.39
Not considered	21	11	32	6.24
Totals	256	257	513	

TABLE 9. — *Deaths.*

DURATION OF DISEASE.	Males.	Females.	Totals.	LENGTH OF RESIDENCE AT SANATORIUM.		
				Males.	Females.	Totals.
Under 1 month	2	—	2	6	5	11
1 to 2 months	—	—	—	8	3	11
2 to 3 months	—	—	—	4	2	6
3 to 4 months	—	1	1	2	3	5
4 to 5 months	—	1	1	4	4	8
5 to 6 months	—	1	1	1	1	2
6 to 7 months	1	—	1	1	7	8
7 to 8 months	—	1	1	1	2	3
8 to 9 months	4	1	5	2	2	4
9 to 10 months	1	2	3	2	1	3
10 to 12 months	2	2	4	4	2	6
12 to 18 months	8	7	15	1	7	8
18 to 24 months	3	6	9	3	1	4
Over 2 years	24	18	42	6	—	6
	45	40	85	45	40	85

TABLE 10. — *Cause of Death.*

	Males.	Females.	Totals.
Pulmonary tuberculosis	42	40	82
Pulmonary abscess	1	—	—
Chronic myocarditis	1	—	—
Carcinoma of larynx	1	—	—
	45	40	85

WESTFIELD STATE SANATORIUM.

RESIDENT OFFICERS.

HENRY D. CHADWICK, M.D., *Superintendent.*ROY MORGAN, M.D., *Acting Superintendent.*HEMAN B. CHASE, M.D., *Senior Physician.*HUBERT P. COLTON, *Assistant Physician.*SAMUEL ISSERLIS, *Dentist.*EMILY B. MORGAN, R.N., *Superintendent of Nurses and Matron.*SARA R. SKERRY, *Dietitian.*JOSEPHINE E. FRENCH, *Treasurer and Chief Clerk.*FLORENCE I. SMITH, *Steward.*BENJAMIN J. SANDIFORD, *Chief Engineer.*WILLIAM G. ATKINSON, *Head Farmer.*

REPORT OF THE SUPERINTENDENT.

TO GEORGE H. BIGELOW, M.D., *Commissioner, Department of Public Health.*

I have the honor to submit the sixteenth annual report of the Westfield State Sanatorium for the year ending November 30, 1925.

During the year there has been expended \$220,678.70 for Maintenance, a gross weekly per capita cost of \$14.583. The details of these disbursements are contained in the report of the treasurer.

There has been collected from miscellaneous sources \$74,744.34. Deducting this amount from the gross maintenance expense leaves a net expense of \$145,898.24 and a net weekly per capita cost of \$9.643. There has been collected from private funds \$2,876.88; from cities and towns \$69,365.02. 8 cases were supported wholly or in part from private funds; 250 by cities and towns; 50 wholly by the state; 14 by the Department of Public Welfare; 64 status undetermined; 2 part cities and part state.

There were 268 patients in the Sanatorium at the beginning of the year; 287 at the close. The largest number present at one time was 313 and the smallest 231. The daily average number of patients was 290.95. There were 388 cases admitted during the year; 93 Bronchial Adenitis, 222 Hilum Tuberculosis, 24 Minimal, 12 Moderately Advanced, 22 Advanced, 2 Bone Tuberculosis, 5 Pulmonary Abscess, 1 Lupus, 2 Tuberculous Peritonitis, 3 Tuberculous Empyema, 1 Unresolved Pneumonia, 1 Unclassified.

There were 263 cases admitted from cities and towns of over 25,000 population, and 125 from cities and towns under 25,000 population. The average age of patients was 10.57 years. Including deaths, there were 369 discharges, and the average duration of residence was 9 months and 18 days. Of those discharged 323 gained 3,663.8 pounds, an average gain of 11.3 pounds per person. Of the discharges there were 73 apparently well; 159 apparently arrested; 2 quiescent; 71 improved; 24 unimproved; 22 not considered, as they remained less than 30 days. There were 18 deaths, 2 more than last year. There were 106,197 hospital days of treatment, 8,559 more than last year.

The following table shows the classification on the application blank and our classification on admission:

	Classification on Application Blank.	Our Classification on Admission.
Bronchial Adenitis	—	93
Hilum Tuberculosis	51	222
Minimal	200	24
Moderately Advanced	69	12
Advanced	6	22
Bone Tuberculosis	2	2
Pulmonary Abscess	—	5
Cervical Adenitis	3	—
Tuberculous Keratitis	1	—
Tuberculous Peritonitis	3	2
Quiescent	1	—
Lupus	—	1
Tuberculous Empyema	—	3
Unresolved Pneumonia	—	1
Unclassified	52	1
	<hr/> 388	<hr/> 388

The gross per capita cost was \$1.02 higher than last year but the net per capita cost was 95c less. This was due to the increase in receipts from the board of patients and also to the increase in the patient population. The price of board was increased from \$4.00 to \$7.00 per week, and the daily average number of patients was 24.25 more than last year. The increased receipts from board amounted to \$32,376.78.

The number of patients admitted with advanced tuberculosis was 22 as compared with 35 of the previous year.

The average residence was 9 months as compared with 12 months last year.

The average gain in weight was 11 pounds. The previous year it was 13 pounds. Considering that the average stay in the sanatorium was three months less, the average gain while under treatment was a trifle more this year. In 1924 it was 1.12 pounds per month. In 1925, 1.25 pounds per month.

There were 18 deaths. Of these 15 were girls and 3 were boys. As I have pointed out in other years, the death rate from tuberculosis in the age period below 16 is always much higher among the girls than the boys.

CLINICS.

The Sanatorium Staff have held 38 examination clinics in 29 different localities. 3 in Hampshire County, 6 in Franklin, 2 in Berkshire and 27 in Hampden Counties. Those in Hampshire County were held in co-operation with Dr. O'Brien. In Hampden County all the small towns have been well covered for several years by the Sanatorium Staff co-operating with the Hampden County Tuberculosis Association. Their nurses have been very efficient in working up these clinics and the underweight and contact cases are not only brought in for examination but excellent follow-up work has been maintained.

The Consultation Clinic in Springfield was discontinued in September because the physicians in that city preferred to send their patients to the Sanatorium without waiting for the monthly clinic. The Out-Patient service has shown a steady growth each year.

	Positive.	Negative.	Suspicious.	Re-examined.	Total.
1. Consultation Clinics	20	43	17	30	110
2. Examination Clinics	17	900	245	179	1,341
3. Out-Patients	90	198	50	104	442
	127	1,141	312	313	1,893

This table shows that 127 new cases of tuberculosis were diagnosed, or 6.6% of the total number examined.

The following table shows the amount of the extra sanatorium work done at Westfield for the past five years:

	1921.	1922.	1923.	1924.	1925.
Consultation Clinics	111	169	229	175	110
Examination Clinics	354	1,286	1,412	1,528	1,341
Out-Patients	118	187	313	388	442
	583	1,642	1,954	2,091	1,893
Out-Patient X-Rays	71	154	344	617	621

THE FIRST YEAR OF THE TEN-YEAR PROGRAM.

About one-half of my time has been given to this work. As these clinics coincide with the school year it seems best to submit the report covering that period rather than the fiscal year. The summary given, therefore, is given on that basis.

The physicians selected for this important work were as follows:

Dr. George Sullivan.
 Dr. David Zachs.
 Dr. Charles Millet.
 Dr. Frederick Gebhardt.

These men all had extensive sanatorium experience in addition to a period of training in the Westfield State Sanatorium in the diagnosis of juvenile tuberculosis.

Two nurses, two stenographers and four nutritionists made up the clinic group. In addition Miss Katherine O'Connor spent all her time in advance work in arranging for these clinics. A technician with a portable X-Ray Machine completed the unit. The work began in Springfield and clinics were held in other places in the following order: Springfield, Ware, Malden, Newton, Fall River, Pepperell, Billerica, New Bedford, Rehoboth, Swansea, Somerset, Westport, Acushnet, Middleboro, Wareham, Mattapoisett, Fairhaven, Plymouth, Arlington, Wakefield, Wilmington, Uxbridge, Milford, Belmont, Medway, Randolph, Avon, Medfield, Walpole, Foxboro, Plainville, Canton, Gloucester, Lawrence, Methuen, North Andover, Beverly, Mansfield, Attleboro, Norwood, Tyngsboro, Dunstable, Stoughton.

In some towns small groups who were examined the year previous by a physician for the State Department of Public Health were re-examined. No attempt was made to carry out the comprehensive plan used in the regular clinics under the Ten-Year Program. These re-examinations were made in the following places: Reading, Topsfield, Everett, Chelmsford, Littleton, Salisbury, West Newbury, Merrimac, Amesbury, Hudson, Maynard, Acton, Wayland, Watertown, Bridgewater, East Bridgewater.

Summary of Results of these Examinations.

Number examined	10,648
Contacts examined	1,612
Tuberculin test given	10,016
Reacted to test	2,927
Removal of tonsils and adenoids advised	3,024
Dentistry advised	4,855
Pulmonary tuberculosis	25
Latent pulmonary tuberculosis	6
Hilum tuberculosis	459
Latent hilum tuberculosis	102
Suspicious cases	1,114

Twenty-nine per cent of the children examined reacted to the Von Pirquet test. Only 31 children of the entire number examined showed pulmonary tuberculosis, and six of these were apparently healed cases.

Five per cent of those examined showed hilum tuberculosis and one-fifth of these were latent or healed cases.

Ten per cent of those examined were classified as suspicious cases. These showed some of the signs and symptoms of juvenile tuberculosis but not enough to warrant a positive diagnosis.

All the positive cases and suspicious cases will be kept under observation by the local school and health authorities and re-examined at the end of a year.

DENTIST'S REPORT.

Dr. Thomas W. Loft resigned in order to go into private practice and was succeeded by Dr. Samuel Isserlis. The following is his report:

The number of operations performed aggregate 3,363 and include the following with their respective totals:

Examinations, 661; Prophylaxis, 420; Extractions, 174; Deciduous Extractions, 357; Injections (Novo), 155; Devitalizations, 9; Root Canal Dressings, 19; Root Canal Fillings, 16; Amalgam Restorations, 121; Amalgam Fillings, 547; Cement Fillings, 421; Sedative Fillings, 244; Synthetic Porcelain, 60; Radiograms, 67; Irrigations, 31; Ethyl Chloride, 32; Treatments, 29; total, 3,363.

The remarks which follow are based on observations and methods employed since I took up my duties here on July 10th, 1925 to December 1st, 1925. From observation it becomes very evident that a large percentage of the patients when first seen at the clinic reveal conditions that are well known to be common to children below par in health and underweight and undernourished. They present for the most part the following oral manifestations: hypotrophic teeth, gingivitis, extensive caries, halitosis, broken down teeth or infected roots, poorly developed jaws, malocclusion, canker sores and history of present or previous odontalgia.

As a routine, each patient is called to the dentist clinic a few days after arriving and a thorough examination of the oral cavity is made with the idea in view of correcting any of the above named conditions as soon as possible.

Examinations. — The teeth and oral tissues are carefully examined at the first appointment and conditions presenting are recorded. At this time the patient is personally instructed in the value of oral cleanliness, the value of the teeth in fostering good health and the best methods of taking care of the teeth. At this time also the teeth are thoroughly cleansed and polished.

Extractions. — At subsequent sittings teeth that are beyond hopes of repair, such as badly broken down molars and infected roots of deciduous teeth, are extracted. This is done painlessly by the use of conduction anesthesia whenever possible. Ethyl Chloride is used in some cases.

Cavity Preparation and Restoration of Teeth. — Realizing the necessity of thorough mastication of food and the function of the teeth in this problem of health building in the cases presented at the clinic, special effort is made to save and restore, in so far as it is possible, a great many teeth which in my judgment will not be detrimental as oral foci of infection if allowed to remain. This is done by devitalization, application of sedatives, cement fillings and other recognized methods. In many cases where cavities are very extensive and patients are extremely nervous, irritable or unusually sensitive to pain novocain anesthesia is used. A great many teeth showing incipient caries are also filled in the cause of prevention.

After the dental work for a patient is completed a note is entered in the records calling for a subsequent appointment at a future date, the interval depending and ranging from one month to six months. Patients are also examined before being discharged. Records of all work performed are accurately kept on file at the clinic.

SANATORIUM SCHOOL.

The increase in the patient population from 265 to 310 made a substantial increase in the number of pupils, and another teacher was added to the staff. The crowded condition in the regular class rooms was partially relieved by dis-

continuing the teaching of Domestic Science and using that room for grade work. This is a temporary makeshift to be used until an addition to the school building providing more class rooms can be obtained.

Miss Avis Waterbury, the principal of the school, files the following report:

Average Daily Attendance December, 1924, to December, 1925.

Grade I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	21.63
Grade II	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	23.85
Grade III	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	21.76
Grade IV	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	25.06
Grade V	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	26.59
Grade VI	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	27.28
Grade VII	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	27.63
Grade VIII	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	17.15
Manual Training	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	31.78
Total Average	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	222.73
Total Enrolment	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	502.

IMPROVEMENTS MADE DURING THE YEAR.

Pavilions. — At an expense of \$24,000 the North and South Pavilions were re-modeled and enlarged. These two new wards are now heated and provide attractive and comfortable accommodations for fifty-four (54) patients each. This has increased our number of beds for patients from 265 to 310.

Paint Shop. — A two-story building was planned to serve as a carpenter shop and a paint shop. The appropriation made, however, only permitted us to construct the lower story to be used as a paint shop. This was built of concrete and is now in use. The fire hazard resulting from having paints and oils in the basement of the Administration Building no longer exists.

Water Supply. — A water main has been laid connecting the Sanatorium with the City of Westfield supply. This will need to be used only in case of emergencies. Eight (8) more wells have been driven and connected with the old water system. Two of the five old wells are discontinued as useless. We now have eleven (11) wells and as they are all good producers, we should have an ample water supply at all times.

NEW CONSTRUCTION.

Addition to School Building.

Our class rooms were overcrowded last year and with the increased capacity for patients the conditions are worse this year. The only way we could find room for the children in the lower grades was to discontinue teaching Domestic Science to the older girls. The plans submitted for an addition to the present school building provide three more class rooms and what is of equal importance sixteen more rooms for employees in the second story. Much as we need the new class rooms, the need for more rooms for employees is even more important. Our nearest city is Westfield, which is three miles away, and this makes it difficult to hire employees who will live at home. We should have sufficient housing to provide maintenance for all employees.

Carpenter Shop. — An appropriation is asked for to add the second story to the paint shop as originally planned. This will enable us to remove the carpenter shop from its present location beneath our Service Building, where it is a fire hazard, and by so doing we will increase our storeroom capacity and give us space for another refrigerator room. The concrete building used for a paint shop can be divided by the addition of another floor into two stories, and it is recommended that this be done. The upper floor will then be available for the storage of records in a fireproof building and also be large enough for a good X-Ray laboratory.

ACKNOWLEDGMENTS.

Religious services have been held each Sunday by the Catholic, Protestant and Jewish chaplains. The same clergymen have officiated for several years and from

their long service have in addition to the religious teachings become important factors in maintaining cheer and discipline in the institution.

The Knights of Columbus have annually distributed gifts to the children at Christmas, and they and other local groups and individuals again this year helped to make Christmas a joyful season for the patients.

The medical staff, office force, heads of departments and other employees deserve much credit for their loyal and faithful service during the year.

HENRY D. CHADWICK,
Superintendent.

VALUATION.

Land.

Grounds, 26.8 Acres	\$5,175 00	
Lawns and Buildings, 26.8 Acres.		
Roads, 0. Acre.		
Woodland, 95.6 Acres	4,664 00	
Mowing, 22.6 Acres	1,695 00	
Tillage, 34 Acres	2,450 00	
Tillage, 22 Acres.		
Garden, 12 Acres.		
Orchard, 2.0 Acres	400 00	
Pasture, 70.0 Acres	1,647 00	
Waste and Miscellaneous, 12.6 Acres	690 50	
Rough pasture, 7.6 Acres.		
Meadow Swamp Land, .0 Acre.		
Sewer beds, 4.0 Acres.		
New coal trestle, 1.0 Acre.		
	<hr/>	
	\$16,721 50	
Sewerage system	13,386 80	
Total	<hr/>	\$30,108 30

Buildings.

Institution Buildings	\$188,202 29	
Farm, Stable and Grounds	26,370 00	
Miscellaneous	69,767 91	
	<hr/>	284,340 20
		<hr/>
Present value of all personal property, as per Inventory of Nov. 30, 1925		\$314,448 50
		90,510 53
Grand total		<hr/>
		\$404,959 03

POPULATION.

	Males.	Females.	Totals.
Number received during the year	185	203	388
Number passing out of the Institution during the year	176	193	369
Number at end of the fiscal year in the Institution	140	147	287
Daily average attendance (number of inmates actually present during the year)	148.09	142.86	290.95
Average number of employees and officers during the year	72	43	115

EXPENDITURES.

Current expenditures:		
1. Salaries and wages	\$95,598 85	
2. Clothing	5,184 93	
3. Subsistence	44,307 79	
4. Ordinary repairs	8,645 78	
5. Office, domestic and outdoor expenses	48,623 17	
	<hr/>	\$202,360 52
Extraordinary expenses:		
1. Permanent improvements to equipment existing buildings	\$14,983 60	
2. Water System (this was brought forward from 1924 appropriation)	3,335 58	
	<hr/>	18,319 18
		<hr/>
		\$220,679 70

Summary of Current Expenses.

Total expenditure	\$220,642 58	
Deducting extraordinary expenses	18,312 53	
	<hr/>	\$202,330 05
Deducting amount of sales		2,484 55
		<hr/>
		\$199,845 50

Dividing this amount by the daily average number of patients, 290.95 gives a cost for the year of \$686,872, equivalent to an average weekly net cost of \$13,209.

STATISTICAL TABLES.

TABLE 1. — *Admissions and Discharges.*

	Males.	Females.	Totals.
Number of patients admitted Dec. 1, 1924 to Nov. 30, 1925, inclusive .	185	203	388
Number of patients discharged Dec. 1, 1924, to Nov. 30, 1925, inclusive	176	193	369
Number of deaths (including those in previous item)	3	15	18
Number in Sanatorium Dec. 1, 1924	131	137	268
Number remaining Nov. 30, 1925	140	148	287

TABLE 2. — *Civil Condition of Patients admitted.*

	Males.	Females.	Totals.
Single	185	203	388
	185	203	388

TABLE 3. — *Ages of Patients admitted.*

	Males.	Females.	Totals.
1 to 13 years	157	153	310
14 to 20 years	28	50	78
	185	203	388

TABLE 4. — *Nativity and Parentage of Patients admitted.*

PLACES OF NATIVITY.	MALES.			FEMALES.			TOTALS.		
	Patients.	Fathers.	Mothers.	Patients.	Fathers.	Mothers.	Patients.	Fathers.	Mothers.
United States:									
Massachusetts	163	56	57	159	59	67	322	115	124
Other N. E. States	5	14	13	12	15	12	17	29	25
Other States	7	10	10	20	21	15	27	31	25
Total Natives	175	80	80	191	95	94	366	175	174
Other Countries:									
Austria	—	1	2	1	3	3	1	4	5
Bermuda	—	—	—	—	1	—	—	1	—
Canada	3	21	28	4	24	22	7	45	50
Egypt	—	—	—	—	—	1	—	—	1
England	2	10	6	—	4	2	2	14	8
Finland	—	3	3	—	1	1	—	4	4
France	—	1	1	—	2	2	—	3	3
Germany	—	1	—	—	1	—	—	2	—
Greece	1	1	2	—	5	4	1	6	6
Ireland	—	17	14	—	14	23	—	31	37
Italy	2	16	16	3	26	22	5	42	38
Lithuania	—	1	1	—	—	—	—	1	1
Poland	—	7	7	—	5	5	—	12	12
Portugal	—	1	1	2	5	4	2	6	5
Roumania	—	—	—	—	1	—	—	1	—
Russia	1	9	7	1	3	6	2	12	13
Scotland	—	1	1	—	—	1	—	1	2
South Africa	1	—	—	—	—	—	1	—	—
Spain	—	1	1	—	1	1	—	2	2
Sweden	—	—	—	—	3	2	—	3	2
Switzerland	—	—	—	—	—	1	—	—	1
Syria	—	1	1	1	1	1	1	2	2
	10	92	91	12	100	101	22	192	192
Unknown	—	13	14	—	8	8	—	21	22
	10	105	105	12	108	109	22	213	214
	175	80	80	191	95	94	366	175	174
	185	185	185	203	203	203	388	388	388

Patients admitted, 388, — females, 203; males, 185.

TABLE 5. — *Residence of Patients admitted.*

Adams, 3	Gardner, 1	Palmer, 1
Agawam, 1	Georgetown, 1	Peabody, 1
Amesbury, 1	Gloucester, 8	Pittsfield, 18
Arlington, 1	Greenfield, 1	Quincy, 19
Ashburnham, 1	Haverhill, 5	Randolph, 1
Athol, 1	Holyoke, 12	Reading, 3
Attleboro, 3	Ipswich, 1	Revere, 1
Beverly, 1	Lawrence, 8	Salem, 5
Boston, 64	Lee, 1	Sherborn, 1
Brighton, 1	Leominster, 4	Somerset, 1
Brockton, 3	Lowell, 6	Somerville, 9
Brookline, 2	Ludlow, 1	South Braintree, 1
Cambridge, 3	Lynn, 20	South Dartmouth, 1
Canton, 4	Malden, 4	Springfield, 42
Chelsea, 15	Mansfield, 1	State Minor Wards, 11
Cheshire, 1	Medford, 1	Stoneham, 1
Chicopee, 9	Methuen, 3	Ware, 3
Clinton, 2	Milford, 2	Watertown, 1
Concord, 1	Needham Heights, 1	Wellesley, 1
East Longmeadow, 1	Newton, 7	West Acton, 2
Everett, 4	Northampton, 1	Westford, 1
Fall River, 5	North Andover, 1	West Springfield, 1
Fitchburg, 4	North Brookfield, 2	Weymouth, 1
Forest Hills, 1	North Chelmsford, 2	Winchester, 1
Foxborough, 1	North Uxbridge, 1	Woburn, 2
Framingham, 1	North Wilbraham, 2	Worcester, 22
Franklin, 1	Norwood, 1	Total, 388.

TABLE 6. — *Occupation of Cases admitted.*

	Males.	Females.	Totals.
School	185	200	385
Factory	—	1	1
Clerk	—	2	2
	185	203	388

TABLE 7. — *Stage of Disease at Admission.*

	Males.	Females.	Totals.	Percentages.
Bronchial Adenitis	45	48	93	23.96
Hilum Tuberculosis	112	110	222	57.21
Minimal	13	11	24	6.18
Moderately Advanced	1	11	12	3.09
Advanced	7	15	22	5.66
Bone Tuberculosis	—	2	2	.52
Pulmonary Abscess	2	3	5	1.30
Tuberculous Peritonitis	1	1	2	.52
Tuberculous Empyema	3	—	3	.78
Unresolved Pneumonia	—	1	1	.26
Lupus	—	1	1	.26
Not classified	1	—	1	.26
	185	203	388	100.00

TABLE 8. — *Condition on Discharge.*

	Males.	Females.	Totals.	Percentages.
Apparently Well	21	52	73	19.78
Apparently Arrested	87	72	159	43.09
Quiescent	1	1	2	.55
Improved	42	29	71	20.05
Unimproved	8	16	24	11.66
Died	3	15	18	4.87
Not considered	14	8	22	—
	176	193	369	100.00

TABLE 9. — *Deaths.*

DURATION OF DISEASE.	Males.	Females.	Totals.	LENGTH OF RESIDENCE AT SANATORIUM.		
				Males.	Females.	Totals.
Under 1 month	—	—	—	1	3	4
1 to 2 months	1	—	1	—	1	1
2 to 3 months	—	—	—	—	3	3
3 to 4 months	—	—	—	1	—	1
4 to 5 months	—	1	1	—	1	1
5 to 6 months	—	3	3	—	1	1
6 to 7 months	—	—	—	—	—	—
7 to 8 months	—	1	1	—	—	—
8 to 9 months	—	2	2	—	—	—
9 to 10 months	—	—	—	—	—	—
10 to 12 months	1	—	1	—	1	1
12 to 18 months	—	1	1	—	2	2
18 to 24 months	1	2	3	1	—	1
Over 2 years	—	5	5	—	3	3
	3	15	18	3	15	18

TABLE 10. — *Cause of Death.*

CAUSE.	Males.	Females.	Totals.
Tuberculosis of the Lungs	3	14	17
Tuberculosis of the Spine	—	1	1
	3	15	18

REPORT OF STATE EXAMINERS OF PLUMBERS.

EXAMINATIONS.	Examined.	Passed.	Refused.
Boston, December, 1924	84	14	70
Lowell, December, 1924	61	13	48
Boston, January, 1925	73	14	59
Pittsfield, January, 1925	16	3	13
Boston, February, 1925	149	21	128
Springfield, February, 1925	89	15	74
Boston, March, 1925	137	30	107
Fall River, March, 1925	63	7	56
Boston, April, 1925	129	17	112
Worcester, April, 1925	53	7	46
Boston, May, 1925	132	12	120
Lowell, May, 1925	50	16	34
Boston, June, 1925	177	24	153
Pittsfield, June, 1925	45	16	29
Boston, July 3, 1925	111	20	91
Boston, September, 1925	183	23	160
Springfield, September, 1925	65	7	58
Boston, October, 1925	70	12	58
Fall River, October, 1925	34	10	24
Boston, November, 1925	89	22	67
Worcester, November, 1925	49	14	35
Totals	1,859	317	1,542

Licenses granted on account of examinations Dec. 1, 1924—Dec. 1, 1925	Masters.	Journeyman.	Total.
	73	207	280

REGISTRATIONS.	Masters.	Journeyman.
December, 1924	—	—
January, 1925	1	1
February, 1925	—	—
March, 1925	—	—
April, 1925	5	2
May, 1925	1	—
June, 1925	1	—
July, 1925	—	—

REGISTRATIONS.						Masters.	Journeymen.
August, 1925	.	.	.	.	.	—	1
September, 1925	.	.	.	.	.	1	—
October, 1925	.	.	.	.	.	—	—
November, 1925	.	.	.	.	.	1	1
Total	.	.	.	.	.	10	5
Meetings	.	.	.	.	.	.	45
Examinations	.	.	.	.	.	.	23
Hearings	.	.	.	.	.	.	—

FEES RECEIVED.						Paid to Treasurer.	
Examination Fees, 1,859, at 50c	.	.	.	.	.	\$929	50
Master Licenses, 83, at \$2.00	.	.	.	.	.	166	00
Journeyman Licenses, 212, at 50c	.	.	.	.	.	106	00
Master Renewals, 1,989, at 50c	.	.	.	.	.	994	50
Journeyman Renewals, 4,069, at 50c	.	.	.	.	.	2,034	50
Back Fees, 192, at 50c	.	.	.	.	.	96	00
						<hr/>	
						\$4,326	50

Expenditures for the Year 1925.

Salaries	.	.	.	.	.	.	\$3,607	50
Traveling	.	.	.	.	.	.	762	90
Express	.	.	.	.	.	.	45	84
Printing	.	.	.	.	.	.	324	07
Postage	.	.	.	.	.	.	126	28
Books, stationery and supplies for typewriter	.	.	.	.	.	.	113	37
Plumber's materials	.	.	.	.	.	.	18	72
Extra services	.	.	.	.	.	.	—
Cleaning	.	.	.	.	.	.	41	00
Office supplies	.	.	.	.	.	.	2	05
Telephone and Lighting	.	.	.	.	.	.	133	01
Miscellaneous	.	.	.	.	.	.	—
Total	.	.	.	.	.	.	<hr/>
						\$5,174	74	
Unexpended balance	.	.	.	.	.	.	\$275	26

Summary of Registrations.

Masters:		Journeymen:	
Certificate holders	472	Certificate holders	500
Licenses ending May 1, 1925	3,354	Licenses ending May 1, 1925	7,524

DAVID CRAIG,
Agent.

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